

<b>JSC Safety and Health Handbook</b>	JPR No.	<b>1700.1K</b>
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## Chapter 8.8 JSC's Fall Protection Program

### 8.8.1 Applicability of this chapter

You are required to follow this chapter if you do any work requiring fall protection at JSC or a JSC field site, whether civil servant or contractor employee. Paragraph 8.8.17 lists the responsibilities of the Fall Protection Program Administrator, Qualified Person, Competent Person, Authorized Person, and supervisors.

### 8.8.2 What this chapter covers

This chapter defines JSC's Fall Protection Program with policy and safety requirements for protecting civil servants and contractors engaged in any activity or operation exposing them to potential falls.

### 8.8.3 Fall protection policy

8.8.3.1 It is JSC policy to:

- a. Protect civil servants and contractors engaged in any activity or operation exposing them to potential falls.
- b. Assess and control fall hazards to prevent injury or loss.
- c. Continually improve the program beyond minimum requirements and standards to prevent falls.
- d. Require fall protection at heights of 4 feet or greater for general industry and 6 feet or greater for construction.
- e. Have a JSC Fall Protection Program Administrator appointed by the Center Director.

### 8.8.4 Controlling fall hazards

8.8.4.1 The following controls, in order of preference, shall apply:

- a. **Hazard Elimination.** Evaluate the specific work creating the fall hazard to determine if a change in process, area, technology, or equipment would eliminate the fall hazard. If so, implement the change.
- b. **Guarding.** Establish physical barriers between the worker and the fall hazard so the barrier can prevent the worker from falling (i.e., guardrails, vertical netting, covers, etc.).
- c. **Fall Restraint.** Use personal fall protection equipment to assemble a system (permanent or temporary) that will prevent a worker from reaching the fall hazard.
- d. **Fall Arrest.** Use personal fall protection equipment to assemble a system (permanent or temporary) that arrests the fall safely before the worker strikes the ground or surrounding structure.
- e. **Administrative Controls.** Administrative controls (such as Safety Monitors) are only allowed in situations where all other fall protection methods are deemed infeasible. This option is available only to employees engaged in leading edge work or precast concrete erection work.

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Administrative controls shall follow 29 CFR 1926.502. A competent or qualified person must approve administrative controls.

### **8.8.5 Fall protection system performance**

- a. Assess clearance and fall distance, as follows:

Fall Distance = Length of Lanyard + Length of Deployed Shock Absorber + Height of the harness dorsal D Ring from workers feet + Safety Factor (3 feet)

NOTE: The vertical distance from the anchorage connector point to the next lower level must exceed the fall distance or the worker will hit the surface.

- b. Many of the JSC roof systems and loggia ledges have the Latchway Fall Arrest Systems. You shall use components and systems compatible with Latchway Systems. If a Latchway System is not feasible, use other fall protection systems.
- c. Fall restraint systems shall meet the following requirements to prevent a worker from reaching the unprotected edge:
- (1) Ensure the anchorage point is able to hold 1,000 pounds.
  - (2) Use a full body harness. Never use waist belts for fall restraint.
  - (3) Design fall restraint systems to meet Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) standards.
- d. Fall Arrest Systems shall meet the requirements in the applicable OSHA subpart(s). Follow ANSI fall protection standards except where deemed inappropriate by a qualified person. Fall arrest systems shall meet the following:
- (1) When using fall arrest systems, the fall distance of the lanyard shall not exceed 6 feet and 900 pounds maximum arresting force, except when designed by a qualified person.
  - (2) Never violate the manufacturer's instructions without the approval and documentation of a qualified person or exceed an arresting force of 1,800 pounds in a fall greater than 6 feet.
  - (3) The installer of the fall protection system (authorized or competent person) shall know the arresting force and the total required clearance of the system.
  - (4) If the system is being installed for workers other than the installer, provide a procedure to ensure the authorized user can determine that the system is approved for use.
  - (5) An acceptable anchorage structure may be I-beams, columns, tower legs, stairwell support structures, or other structures capable of holding 5,000 pounds per person or designed by a qualified person with a safety factor of 2. If the anchorage is questionable, do not use the system and notify a competent or qualified person.
- e. You shall use a personal fall arrest system in conjunction with a work positioning system. Rig the positioning system so the employee shall not free fall more than 2 feet.

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## **8.8.6 Fall protection equipment**

8.8.6.1 Fall protection equipment shall meet the following requirements:

- a. Meet or exceed OSHA and ANSI Fall Protection Standards. All new fall protection equipment must meet the most current ANSI/ASSE Z359.1 at the time of purchase.
- b. Follow manufacturer’s instructions when using fall protection equipment. Only a qualified person may change the instructions based on calculations with fall protection engineering support, and shall document those changes before use and maintain the documentation until the equipment is removed from service.
- c. Inspect fall protection equipment per paragraph 8.8.12 below.
- d. Never use equipment not designed for fall protection without the approval of a qualified person based on engineering calculations. Document the approval and label the equipment “For Fall Protection Use Only.”
- e. Never use harnesses and lanyards that have been impact- or load-tested.
- f. Once equipment has been exposed to a fall, remove it from service and dispose of it immediately.
- g. Take defective equipment out of service and return it to the manufacturer.
- h. Use equipment as designed for fall protection only. Under no circumstances use it to hoist tools or other work materials.

## **8.8.7 When and how to use a safety net**

8.8.7.1 You shall follow 29 CFR 1926.502, “Fall Protection Systems Criteria and Practices,” or the following requirements for safety nets:

- a. Provide a safety net for workplaces where other means of fall protection, such as scaffolding, ground-supported personnel-lifting devices, lifelines, or safety harnesses, cannot protect a worker due to the conditions of the elevated work area. These conditions may include:
  - (1) Structural ironwork where there is no tie-off.
  - (2) Working above bodies of water.
  - (3) The height of the work area is such that using ladders or erecting scaffolding would be a greater risk.
  - (4) The area isn’t accessible with ground-supported personnel-lifting devices.
- b. You may also use safety nets, specifically designed as debris nets, where there is a danger of items dropping from the workplace and endangering people below.

## **8.8.8 Specific fall hazards and assessments**

- a. For walking or working surfaces with unprotected edge or opening or other fall potential of four feet (general industry) or greater to surface below and six feet (construction industry) or greater to a lower level, you shall meet the following:
  - (1) If a vehicle or trailer is used as a walking or working surface, a competent person shall evaluate the need for fall protection.

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(2) If work requires employees to be closer than 6 feet from any unprotected edge or opening, use positive fall protection (guardrail system or personal fall protection to include harness with arrest or restraint system) or other means, such as vehicle mounted work platforms or scaffolding.

**NOTE:** Be cautious when using guardrails or chains as a secondary means of positive fall protection. Such mechanisms may be subject to failure due to wear and tear and/or faulty design, construction, installation, and testing. Personnel should not lean on guardrails, gates, or chains.

- b. Horizontal Life Lines: Install commercially available ANSI-approved temporary horizontal life lines per manufacturer's written instructions. Only a qualified person may change the instructions based on calculations to show they meet ANSI Z359.1. Those changes must be documented before use. If not commercially designed, a qualified person must design and provide installation.
- c. Over/Near Water Operations: If employees are required to work over or near water, the employer shall protect them from falling as required by this chapter. This applies to construction activities, and is not intended to apply to marine operations governed by 29 CFR 1917, Subpart B, Marine Terminal Operations. For construction or maintenance activities, you shall also follow 29 CFR 1926.106.
- d. Tower Climbing Operations: Climbing towers presents unique hazards not associated with other jobs requiring fall protection. Before tower climbing, you shall address the following:
  - (1) Weather conditions
  - (2) Coordination with fire rescue
  - (3) A rescue plan
  - (4) Safe transport of equipment and tools
  - (5) Safe tower energy sources
  - (6) Ensure at least two climbers are present and trained to climb towers
  - (7) Training and certification.
- e. Roof work on low-sloped or flat roofs (less than or equal to a 4:12 pitch) shall meet the following:
  - (1) From unprotected edge to 6 feet, use positive fall protection.
  - (2) From 6 feet to 15 feet, you may use a warning line and safety monitor system in lieu of positive fall protection.
  - (3) Fifteen feet or more from unprotected edge, you may use a warning line without a monitor in lieu of positive fall protection.
- f. Roof work on steep roofs (greater than a 4:12 pitch) requires positive fall protection at all times.

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- g. Non-roof work on steep roofs(greater than a 4:12 pitch) requires positive fall protection, such as a personal fall arrest system or restraint system, guardrails, or use of other means, such as aerial lifts or scaffolding.
- h. Non-roof work on roofs with a pitch less than 4:12 above 6 feet shall meet the following:
  - (1) From unprotected edge to 6 feet, use positive fall protection.
  - (2) From 6 feet to 15 feet, you may use a warning line.
  - (3) Fifteen feet or more from unprotected edge, no warning line is required.
- i. Roof inspections shall meet the following:
  - (1) For inspections or assessments only during pre- and post-construction work, follow the requirements for “Non Roof Work on Roofs” in this paragraph.
  - (2) For inspections during construction activities, follow the requirements for “Roof Work on Roofs” in this paragraph.

**8.8.9 Precautions to take when working where fall protection is required**

8.8.9.1 You shall follow the requirements below:

- a. Use a full body harness.
- b. Use suspension trauma relief devices.
- c. Use lifelines, lanyards, and harnesses only for safeguarding workers. Don't use them for any other purpose. A lifeline shall be able to support a minimum dead weight of 5,000 pounds per person applied to the center of the lifeline.
- d. Securely buckle all harnesses and wear them tight enough to prevent yourself from slipping out.
- e. Secure lanyard to fixed anchorages and use pads over sharp corners.
- f. Keep lanyard length as short as the work allows. Always ensure the attachment is positioned as high as possible when you are in position to do work.
- g. Use a body harness and shock-absorbing device in the lanyard system if a long freefall is possible.
- h. Make sure you are securely attached to a secondary restraint system when using a bosun's chair.

**8.8.10 Fall protection for specific operations**

- a. On articulating lifts, you shall:
  - (1) Use an energy-absorbing length-adjustable lanyard and full body harness.
  - (2) Connect the lanyard to an approved anchor point in the basket.
  - (3) Adjust the lanyard length to reduce the possibility of the worker falling over the guardrails, yet allows the work to be accomplished.

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b. For Scaffolding, you shall:

- (1) Designate a competent person to supervise fall protection for employees working on scaffolds.
- (2) Erect and dismantle per chapter 8.7.
- (3) Provide fall protection (guardrails, fall arrest, fall restraint) where the potential for a fall 6 feet or greater exists. A qualified person may develop a fall protection plan for scaffolding up to 10 feet in height if fall protection systems are not feasible.
- (4) Use positive fall protection when the scaffold height is greater than 10 feet.
- (5) During scaffold erection and dismantling, have a person trained to the level of competent person determine if fall protection systems (guardrails, fall arrest, fall restraint) can be used and provide written approval.

NOTE: A scaffolding-competent person is not the same as a fall protection-competent person.

c. Ladder climbing shall meet the requirements in chapter 8.7 and the following:

- (1) For fixed ladders, use appropriate personal fall protection equipment when climbing fixed ladders equipped with fall protection systems such as cable grabs or rails.
- (2) For portable ladders, personal fall protection equipment is not required.

d. Excavations shall meet the following:

- (1) A fall protection system is required for excavations or trenches 4 feet in depth or greater.
- (2) Barriers shall be an adequate distance back on the outside perimeter of the spoil pile or an adequate set distance from the excavation opening, so that support posts and barriers do not fail if a person falls against the barrier. The minimum distance from the excavation opening is 2 feet, unless the ground is unstable or the side wall is undercutting or fissured.

### **8.8.11 Storage and maintenance of fall protection equipment**

8.8.11.1 You shall store and maintain fall protection equipment as follows:

- a. Never store personal fall arrest equipment in the bottom of a toolbox, on the ground, or outdoors exposed to the elements (e.g., sun, rain, snow, etc.).
- b. Hang equipment in a cool, dry location in a manner that retains its shape.
- c. Clean with a mild, nonabrasive soap and hang to dry.
- d. Never force dry or use strong detergents in cleaning.
- e. Never store equipment near excessive heat, chemicals, moisture, or sunlight.
- f. Never store in an area with exposures to fumes or corrosive elements.
- g. Avoid dirt or other types of buildup on equipment.
- h. For testing purposes, use only sample equipment and worn equipment or equipment of doubtful integrity. Test them to destruction, if possible, or at least to a 4:1 safety factor of the

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anticipated load. Keep equipment that was used for testing only as samples to help judge the safety of other equipment.

### **8.8.12 Inspecting fall protection equipment**

- a. Inspections shall follow manufacturer's recommendations.
- b. The end user shall inspect his or her fall protection equipment before and after use.
- c. The competent person shall inspect fall protection equipment semi-annually per the manufacturer's guidelines or checklist in d below.
- d. The employer shall inspect fall protection equipment annually, submit the results to the Fall Protection Administrator, and indicate the date inspected on the manufacturer's inspection tag or equivalent documentation available for audit or inspection to show compliance. Any component of a personal fall arrest system found to be defective, damaged, or worn shall be withdrawn from service and disposed of immediately. Annual inspections shall use manufacturer's guidelines or the following checklists at URL:  
<https://jsc-sma-missp.jsc.nasa.gov/sites/safety/Checklists/Home.aspx>:
  - (1) Full Body Harness Annual Inspection Checklist (NS-PA-CH06-1)
  - (2) Lanyards Annual Inspection Checklist (NS-PA-CH06-2)
  - (3) Self-Retracting Lanyard/Lifeline Annual Inspection Checklist (NS-PA-CH06-3)
  - (4) Snap Hooks and Carabineers Annual Inspection Checklist (NS-PA-CH06-4)

### **8.8.13 Fall protection plan**

- a. Contractors working at JSC shall submit a Fall Protection Plan addressing specific and potential fall hazards that will be encountered while working at heights.
- b. Construction contractors working at JSC shall submit a Site-Specific Fall Protection Plan that:
  - (1) Meets 29 CFR 1926.502(k)
  - (2) Addresses project-specific fall hazards that will be encountered while working at heights
  - (3) Becomes a part of the contractor's overall Site-Specific Safety and Health Plan, which addresses the contractor's approach to implementing the requirements of the JSC Fall Protection Program and all applicable OSHA regulations.

### **8.8.14 Qualifications and training**

8.8.14.1 The following personnel shall be trained as described in the Fall Protection Training Matrix, Attachment 8.8A, Appendix F, and meet the qualifications indicated:

- a. The Fall Protection Program Administrator shall:
  - (1) Have the skills, experience, and abilities to ensure effective management of the Center's or employer's fall protection program. This would include a working knowledge of current fall protection regulations, standards, fall protection equipment, and systems.

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- (2) Be appointed in writing by the JSC Center Director . For contractors, the contract project manager shall appoint a contractor program administrator.
- b. A Qualified Person shall be:
  - (1) Identified in writing by the Fall Protection Program Administrator. Documentation shall include training records.
  - (2) Familiar with fall protection practices, equipment, regulations, engineering principles, and the effects permanent fall protection systems will have on the surrounding structure.
- c. A Competent Person shall:
  - (1) Be identified in writing by the Fall Protection Program Administrator. Documentation shall include training records.
  - (2) Be responsible for the immediate application of fall protection requirements where fall protection is required.
  - (3) Be knowledgeable of applicable fall protection regulations, standards, equipment and systems, and mandatory requirements for fall protection equipment and systems used by their employers.
  - (4) Have work experience related to the application where fall protection is required.
  - (5) Have the ability to identify unsafe conditions or practices as they relate to fall protection during the course of the work and have the authority to take prompt corrective action.
- d. An Authorized Person shall have training per the Training Matrix in Attachment 8.8, Appendix F.
- e. Trainers shall have training per the Training Matrix in Attachment 8.8, Appendix F, and the following qualifications:
  - (1) Competent Person Trainer – Experience, knowledge, training and education as a Competent Person.
  - (2) Competent Rescue Person Trainer – Experience, knowledge, training and education as a Competent Rescue Person.
  - (3) Qualified Person Trainer – Experience, knowledge, training and education as a Qualified Person.

**8.8.15 Emergency preparedness and response**

- a. Before starting any work activity where fall protection is an issue, the employer shall develop rescue plans and discuss them with all employees. A rescue plan is available for tailoring (NS-TMP-FP-001) at the URL: <https://jsc-sma-missp.jsc.nasa.gov/sites/safety/Checklists/Home.aspx>.
- b. In the unlikely event a fall arrest occurs on site, personnel, using an articulating man lift or ladders where feasible, shall rescue the affected employees if rescue by ladder or man lift is feasible.

NOTE: Authorized Rescuer training is not required for rescue via ladder or man lift.

- c. Technical high-angle rescue will be through local emergency services.



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- d. All employees involved in a fall arrest or fall shall immediately be sent for a medical evaluation to determine the extent of injuries.
- e. In the event of a fall, notify the following people as soon as possible:
  - (1) Rescue personnel :JSC, Sonny Carter Training Facility, and Ellington Field Emergency Number, x33333 or 281-483-3333 ;White Sands Emergency Number, x5911
  - (2) Manager or supervisor
  - (3) Project manager
  - (4) Safety representatives
- f. The competent person or contractor safety representative shall report and investigate all falls per chapter 2.6 of this Handbook.

**8.8.16 Fall protection program evaluation**

8.8.16.1 The JSC Fall Protection Program Administrator shall evaluate JSC’s fall protection program yearly to determine its effectiveness via the following criteria:

- a. Accident reports
- b. Number of accidents
- c. Management/staff compliance with program components
- d. Periodic on-site audits
- e. Staff feedback and interviews

**8.8.17 Responsibilities for fall protection**

- a. As the **JSC Fall Protection Program Administrator**, you are responsible for:
  - (1) Developing, implementing, and coordinating JSC’s fall protection program.
  - (2) Evaluating the Center-wide hazards, determine where protection from falls from elevations is required, and establish any additional, more stringent requirements necessary to protect against Center-specific fall hazards.
  - (3) Providing guidance and oversight to ensure NASA fall protection requirements are included in contracts where contractor employees will be working in situations that require fall protection.
  - (4) Providing oversight to ensure NASA fall protection requirements are included in work instructions for work in situations requiring fall protection.
  - (5) Providing oversight to ensure anyone who is identified as a qualified person, to serve as a subject matter expert in support of the Center’s fall protection program, fulfills the responsibilities and qualifications in this chapter.
  - (6) Providing oversight to ensure, for each situation that requires fall protection at the Center (NASA or contractor led), there is a competent person assigned responsibility for the

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immediate application of fall protection requirements where fall protection is required, whose education and training meet requirements as defined below.

- (7) Remaining current with changing OSHA and ANSI fall protection requirements, NASA requirements, local laws, and new fall protection systems.
- (8) Conducting an annual review and audit of the Center's fall protection program to ensure compliance with NPR 8715.3. Use of new technology, regulations, and industry practices should be considered during the annual review and audit.
- (9) Establishing a JSC Fall Protection Program committee.
- (10) Ensuring JSC prime contractors and subcontractors appoint, in writing, a fall protection program administrator or team.
- (11) Ensuring available fall protection equipment is included in the training of competent, authorized, and qualified people.

NOTE: A contractor's Fall Protection Program Administrator has similar responsibilities for work under the contract.

b. As a **Qualified Person**, you are responsible for:

- (1) Supporting the program administrator, competent and authorized persons, and the fall protection program by supplying technical information and serving as a subject matter expert.
- (2) Being available when the authorized or competent person cannot select an appropriate non-engineered anchorage for a fall arrest or fall restraint system.
- (3) Designing and documenting any permanent anchorage, fall arrest system, fall restraint system, or lifeline (vertical and/or horizontal).

c. As a **Competent Person**, you are responsible for:

- (1) Being available to authorized persons when fall protection situations arise to identify unsafe conditions or practices as they relate to fall protection and taking prompt corrective action.
- (2) Helping authorized persons when requested to ensure non-engineered anchorages selected are acceptable, fall protection system(s) will work as intended, fall protection equipment is inspected prior to use, fall protection systems are used per manufacturer's recommendations, OSHA requirements, qualified person designs, and local policy, and rescue plans are in effect.

d. As an **Authorized Person**, you are responsible for:

- (1) Protecting yourself by applying fall protection practices during the course of the work.
- (2) Inspecting, installing, using, and dismantling fall protection equipment according to manufacturer's instructions, OSHA requirements, and local policy.
- (3) Notifying a competent person for determination of the appropriate action to be taken when conducting any work where required fall protection is not in place or the performance of the fall protection system is unpredictable.

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(4) Ensuring these requirements are adhered to as written.

e. As a **Supervisor**, you are responsible for:

- (1) Ensuring JSC fall protection requirements are included in work instructions where JSC employees or contractors will be working in situations that require fall protection.
- (2) Ensuring anyone who is identified as a qualified person to serve as a subject matter expert in support of JSC's Fall Protection Program has been trained per paragraph 8.8.14 above.
- (3) Ensuring a JSC-designated competent person is assigned responsibility for the application of fall protection requirements where required.