

National High Magnetic Field Laboratory Safety Program

TITLE: Fall Hazard Recognition, Prevention and Control Program	SUBJECT: Fall Protection Program
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Additional Approval Signatures on Revision and Approval Page	Can / Elm

Overall Mission and Overview:

The National High Magnetic Field Laboratory (NHMFL) Environmental, Health, and Safety (EHS) program's mission is to:

Provide support and guidance to all NHMFL departments with the implementation, maintenance and review of a comprehensive environmental, health, and safety program. The primary goal of the NHMFLs EHS program is to control, reduce or eliminate work-related injuries, illnesses and loss of NHMFL resources.

The NHMFL is charged by the National Science Foundation (NSF) to safely:

- Promote magnet-related research to serve an interdisciplinary scientific user community.
- Provide unique high-magnetic-field facilities through a competitive and transparent proposal review process.
- Advance magnet and magnet-related technology.
- Partner with universities, other national laboratories and industry to enhance national competitiveness in magnet and related technologies.
- Serve the NSF as a prominent example of its successful stewardship of large research facilities.
- Support science and technology education in the United States.
- Increase diversity in the science, technology, engineering, and mathematics workforce
- Promote collaboration among our three partner institutions: Florida State University (FSU), the University of Florida (UF) and Los Alamos National Laboratory (LANL).



FALL PROTECTION PROCEDURE INDEX

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1.0 PURPOSE

The purpose of this Program is to protect workers from both falls and fall hazards by providing requirements to employees and contractors in selecting, inspecting, and using fall protection systems and equipment. This Program:

- Defines the minimum requirements to ensure employee and contractor safety while working at elevated heights and
- Ensures that National High Magnetic Field Laboratory (NHFML) personnel have the information to identify and select the appropriate fall protection equipment.

2.0 POLICY

The National High Magnetic Field Laboratory (NHMFL) Fall Hazard Recognition, Prevention and Control Program requires the use of fall prevention and fall protection measures for all work occurring at any height that is liable to cause personal injury. These surfaces include:

Leading edges, roofs, tanks, manholes, aerial lifts, ladders, slopes steeper than 2:1 (horizontal to vertical) and surfaces with open holes or skylights.

It is NHMFL Policy to utilize these four generally accepted categories for fall prevention and protection:

- 1. Fall elimination
- 2. Fall prevention
- 3. Fall arrest
- 4. Administrative controls

3.0 SCOPE

The NHMFL Fall Protection Program controls the risk of falls while individuals are working at heights through planning and recognition, training, installation, implementation of fall protection equipment, and rescue systems.

At the NHMFL, new work surfaces higher than 4 feet must be designed to eliminate the need for fall arrest systems. When feasible, existing work surfaces higher than 4 feet must be modified to eliminate the need for fall arrest systems. Eliminating the need for fall arrest systems may be accomplished through the application of engineering controls (such as lowering the work surface or providing barriers, such as parapets, that prevent contact with the leading edge) or administrative controls (such as changing a process, sequence, or procedure so that workers do not need to work at heights).



When there is a greater hazard or it is infeasible to modify existing work surfaces, workers must use fall protection systems in any situation that presents an exposure to a fall hazard. Fall protection work controls include guardrail systems, safety net systems, personal fall-arrest systems, and scaffolding and platform ladders.

4.0 REFERENCES

- 4.1 OSHA General Industry Standards, 29 CFR 1910 Subpart D Walking-Working Surfaces
- 4.2 OSHA General Industry Standards, 29 CFR 1910.140 Personal Fall Protection Systems
- 4.3 OSHA Construction Standards, 29 CFR 1926 Subpart M Fall Protection
- 4.4 ANSI/ASSE Z359, Fall Protection Code
- 4.5 ANSI/ASSE A1264.1, Safety Requirements for Workplace Walking/Working surfaces

5.0 ROLES AND RESPONSIBILITIES

The employee:

- Completing required training prior to use of fall protection equipment.
- Following this Program when working in areas with fall hazards.
- Inspecting ladders and/or fall protection equipment as outlined by manufacturers recommendations prior to use.
- Knowing the hazards that may be encountered during work conducted at elevated locations, including information on the types of equipment to be used and their safe use and inspection.
- Being knowledgeable and trained on this procedure and the hazards of the job.
- Ensuring that tools and materials are secured to avoid potential injury to workers below by establishing a hardhat and/or exclusion zone where necessary.

The supervisor:

- Responsible that employees are knowledgeable and trained on this Program.
- Responsible that contractors are compliant with this Program.
- Identifying fall hazards within their area of responsibility.
- Communicating fall hazards to employees.
- Securing access to areas where fall hazards exist.

The NHMFL Safety Department:

- · Administer the Fall Protection Program.
- Authorize appropriate personnel to work at height requiring the use of this Program.



- Conduct an annual review of this Program.
- Ensure affected employees are trained in the purpose, scope, application, and function of this
 Program. Personnel working under this Program shall be competent in the skills required for the safe
 application, usage, and release of fall protection prior to starting work. The NHMFL Safety
 Department will provide the training of all affected personnel on this Program.
- Conduct additional retraining of employees (as applicable) whenever a periodic inspection or other event indicates there are deviations from or inadequacies in the administration, knowledge, and application of this Program.
- Responsible for the issuance of fall protection and restraint devices and equipment.
- Maintain a training record for each employee. The record will contain the name of the employee trained, date of training, and a record of the person who conducted the training.

The NHMFL personnel who contract labor:

- It is the responsibility of the NHMFL personnel who contract labor to ensure the requirements, application, administration, and adherence to the provisions of this Program are maintained by the contractor. In general, the person who contracts the labor, will provide for oversight.
- Contractors are responsible for their own fall protection equipment that meets the requirements of applicable OSHA standards and this Program.

6.0 TRAINING REQUIREMENTS

Before their initial assignment, employees who are required to use fall protection equipment in the performance of their job must be instructed and trained in fall protection equipment use and maintenance. Additional training must be conducted when changes occur, or as needed.

In addition, each employee who may be exposed to fall hazards must be trained to recognize such hazards.

A person with competency in the nature of fall hazards in the work area, the correct procedures for using and inspecting fall protection systems, and system limitations used, must conduct the training. Employees must be retrained whenever:

- Changes in the workplace render previous training obsolete.
- Changes in the type of fall protection systems or equipment render previous training obsolete.
- Inadequacies in an employee's knowledge or use of fall protection systems indicate the employee does not have the requisite understanding or skill. Each employee who may be exposed to fall hazards must be trained to recognize the hazards and the procedures to mitigate those hazards.
- The training must be provided by persons experienced with and knowledgeable in the following areas:
 - This Program,
 - o Fall hazards in the work area,



- Correct procedures for erecting, maintaining, disassembling and inspecting the fall protection systems used,
- Selection, proper use, and care of equipment comprising a personal fall arrest system,
- o Role of employees in fall protection plans, and
- What rescue procedures to follow in case of a fall

7.0 FALL HAZARD IDENTIFICATION

A Supervisor, through training with the Safety Department, must identify any fall hazard and provide the required personal fall protection equipment. The Supervisor should be a competent person, as defined by OSHA, or assign someone to be the competent or qualified person.

OSHA defines a competent person as:

- A person who is capable of identifying existing and predictable hazards in the surroundings or identifying working conditions which are hazardous or dangerous to employees,
- Who has authorization to take prompt corrective measures to eliminate them,
- Conducts equipment inspections and removes damaged equipment from service, and
- Is knowledgeable in the application and use of fall protection equipment;

OSHA defines a qualified person as:

An individual, who by possession of recognized degree, certificate, or professional standing or who
by extensive knowledge, training, and experience has successfully demonstrated his/her ability to
solve or resolve problems relating to the subject matter, work, or project.

8.0 FALL ARREST SYSTEMS

There are three main components to the personal fall arrest system. This includes:

- 1. The personal protective equipment the employee wears,
- 2. The connecting devices, and
- 3. The anchorage point.

The system must meet the following criteria for each component:

- 1. Personal Protective Equipment:
 - Full body harnesses are required.
 - Body belts may only be used for positioning, never as a fall protection component.



- o The attachment point of the body harness is the center D-ring on the back.
- O Horizontal lifeline systems when used in combination with personal protective equipment may use the center D-ring on front of harness.
- This same combination of horizontal lifeline and body harness can also serve as a fall restraint system, limiting the worker's ability to move close enough to fall over an unprotected leading edge.
- Employees must always tie off at or above the D ring of the harness except when using lanyards specifically designed for lower tie offs.
- Harnesses or lanyards that have been subjected to an impact load must immediately be removed from service and destroyed.
- Load testing must not be performed on fall protection equipment.

2. Connecting devices:

- This device can be a rope lanyard or web lanyard, rope grab, retractable lifeline or fixed lifeline designed for fall protection.
- Only locking snap-hooks may be used.
- Horizontal lifelines will be designed by a qualified person and installed in accordance with the design requirements.
- Lanyards and vertical lifelines need a minimum breaking strength of 5,000 pounds.
- o The length of a shock-absorbing lanyard shall not exceed six feet.
- o The use of steel lanyards is prohibited (excluding self-retracting lanyards).
- Lanyards may not be clipped back to itself (e.g. around an anchor point) unless specifically designed.
- o If vertical lifelines are used, each employee will be attached to a separate lifeline and separate anchor point.
- Lifelines must be protected against being cut or abraded.

3. Anchorage:

Secure anchor points are the most critical component when employees must use fall arrest equipment. The NHMFL buildings have existing structures that can be used as an anchor point:

- Support beams, joists and girders
- Roof tie-back posts
- Permanent engineered anchor points
- An approved crane or winch system (Refer to: Appendix C Anchoring to the hook or load line of an overhead crane)



Other work locations and assignments may require the installation of a temporary or permanent anchor. As a minimum, the following criteria must be considered for each type of anchor point:

- Must be sound and capable of withstanding a 5000 lb. static load (per person) when using a shock-absorbing lanyard.
- Must be easily accessible to avoid fall hazards during hookup.
- Direct tying off around sharp edged structures can reduce breaking strength by 70% therefore; chafing pads or abrasion resistant straps must be used around sharp edged structures to prevent cutting action against safety lanyards or lifelines.
- o Anchor points must be at the worker's shoulder level or higher to limit free fall to 6 feet or less and prevent contact with any lower level.
- Choose anchor points that will prevent swing fall hazards. Potentially dangerous "pendulum" like swing falls can result when a worker moves horizontally away from a fixed anchor point and falls. The arc of the swing produces as much energy as a vertical free fall and the hazard of swinging into an obstruction becomes a major factor. Raising the height of the anchor point can reduce the angle of the arc and the force of the swing. Horizontal lifelines can help maintain the attachment point overhead and limit the fall vertically. A qualified person must design a horizontal lifeline.

4. Permanent Anchor Requirements:

- o In addition to all the criteria listed above, the following points must be considered:
 - Environmental factors and dissimilarity of materials can degrade exposed anchors.
 - Compatibility of permanent anchors with employee's fall arrest equipment.
 - Visibly identify permanent anchors.

5. Non-certified Anchorage:

o A fall arrest anchorage that a competent person judges is capable of supporting the predetermined anchorage forces.

9.0 EQUIPMENT INVENTORY AND INSPECTION

- 9.1 The employee must inspect the entire personal fall arrest system prior to every use. Reference: Appendix A: Personal Fall Arrest System Pre-Use Inspection.
- 9.2 A competent person must inspect employees' issued fall protection equipment and systems in use at the initial installation and annually thereafter. (Annual inspection sheet checklist is located in Appendix B).



- 9.3 Inspection records will be maintained by the Safety Department.
- 9.4 There are no OSHA Guidelines or ANSI Standard about how long a harness or lanyard can be left in service. Both refer to the manufacturer to determine this.
- 9.5 Life Expectancy of Honeywell Harnesses and Lanyards

ANSI does not reference a maximum service life for synthetic fiber products.

ANSI standards require that the user remove the equipment from service if it has been subject to the forces of arresting a fall. ANSI also states that when inspection reveals defects in, damage to, or inadequate maintenance of equipment, the equipment shall be permanently removed from service or undergo adequate corrective maintenance before return to service.

Each harness and lanyard shipped by Honeywell Safety Products (Miller and North branded products) is accompanied by specific instructions for use, inspection, and cleaning that must be understood and followed. Instructions require that all fall protection products, including harnesses and lanyards be visually inspected prior to use and regularly inspected by a Competent Person, such as defined by ANSI and OSHA.

Following these instructions may still necessitate removing the harness or lanyard from service prior to any life expectancy guideline, due to the normal wear and tear of everyday use. Likewise, proper adherence to the inspection and maintenance criteria may extend the useful life. Ultimately, it is the responsibility of the end-user to determine when a harness or lanyard is unfit for use and should be removed from service. (Honeywell Safety Products TL 014 – ANSI Life Expectancy Statement Rev 2, 9-25-2013).

10.0 FALL PROTECTION RESCUE PLAN

Rescue is an integral element of planning for work using a personal fall-arrest system. OSHA requires that the employer shall provide for prompt rescue of employees in the event of a fall or must assure that employees are able to rescue themselves.

An appropriate emergency response rescue plan shall be prepared prior to any work that requires fall protection to protect against a fall hazard:

These hazardous conditions may include:

- Working in an exclusion zone or near a leading edge.
- Working from any type of aerial work platform, aerial device, elevating work platform or mobile elevating work platform.
- Work that utilizes a fall protection system (Full body harness, horizontal lifeline or self-retracting lifeline)
- Working under a Site Specific Fall Hazard: Operating Procedure



Each NHMFL Division, FSU facilities employee, or Contractor that is required to use fall protection must submit a fall protection rescue plan as part of the Task Hazard Analysis.

- A rescue plan can cover work of similar scope within a division.
- A rescue plan must be approved by the Safety Department any time before work starts.
- A rescue plan must accompany a Task Hazard Analysis that includes a working at height hazard.
- A rescue plan will be available for any work that has a Site Specific Fall Hazard.

To write a fall protection plan, use the following sections (10.1 - 10.4) as a guide:

10.1 Self-Rescue and Assisted Rescue:

Emergency procedures shall be in place to cover reasonably foreseeable circumstances such as failed access equipment or deployed fall arrest, in order that personnel can be rescued.

- Local emergency services (911) shall be included but considered a secondary response for a rescue plan.
- Methods selected need to be proportionate to the risk.
- Simple systems may be appropriate and shall be in place if needed for a rescue.
- Simple systems may include:
 - 1. Staging a ladder to assist in rescue or
 - 2. Staging an aerial work platform to assist in rescue
- More detailed systems may be required (e.g. the use of other work equipment such as mobile elevating work platforms, articulated lifts, or proprietary rescue systems).

10.2 Utilizing a stand-by rescue team:

A stand-by rescue team, when contracted, will have the ability to respond to an emergency in a timely manner and possess the equipment and skills necessary to promptly rescue employees after a fall.

10.3 Utilize a contracted vendor:

An outside vendor may be contracted to provide rescue services. They must submit their fall protection program that satisfies all of the NHFML's fall protection requirements, including a rescue plan.

10.4 Emergency Response: Tallahassee Fire Department (TFD) Assistance:

The NHMFL relies on the Tallahassee Fire Department Emergency Response for emergency medical treatment and as a secondary response for rescue assist (911).



• To establish a rescue plan with the Tallahassee Fire Department, contact the NHMFL's primary fire station located at Station 4: Pensacola and Appleyard Drive.

Station 4 - Shift Captain Contact Information: 850-891-6600

- The firefighters at Station 4 are trained in technical rescue. In addition, Station 4 maintains the Urban Search and Rescue team.
- If The Tallahassee Fire Department is part of your primary rescue plan they must be briefed prior to any work being done. Request the TFD to visit the project site to determine site suitability, train for rescue purposes, and assist with a potential fall hazard rescue.



11.0 APPENDIX A: PERSONAL FALL ARREST SYSTEM PRE-USE INSPECTION

Harness Inspection

- **Webbing** Inspect the entire surface of webbing for damage. Beginning at one end, bend the webbing in an inverted "U". Holding the body side of the belt toward you, grasp the belt with your hands six to eight inches apart. This surface tension makes the damaged fibers or cuts easier to see. Watch for frayed edges, broken fibers, pulled stitches, cuts, burns, and chemical damage.
- "D" Rings/Back Pads Check "D" rings for distortion, cracks, breaks, and rough or sharp edges. The "D" ring should pivot freely. "D" ring back pads should also be inspected for damage.
- Attachment of Buckles Note any unusual wear, frayed or cut fiber, or distortion of the buckles.

Tongue/Grommet

- The tongue receives heavy wear from repeated buckling and unbuckling. Inspect for loose, distorted or broken grommets. The webbing should not have any additional punched holes.
- Tongue Buckle Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. The roller should turn freely on the frame. Check for distortion or sharp edges.
- Friction and Mating Buckles Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points of the center bar.

Lanyard Inspection Hardware

- Snaps Inspect closely for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper locks must prevent the keeper from opening when the keeper closes.
- Thimbles The thimble must be firmly seated in the eye of the splice, and splice should have no loose or cut strands. The edges of the thimble must be free of sharp edges, distortion, or cracks.

Lanyard

- **Web Lanyard** while bending the webbing over a curved surface such as a pipe, observe each side of the webbed lanyard. This will reveal any cuts or breaks. Examine the webbing for swelling, discoloration, cracks, or burns. Observe closely for any breaks in the stitching.
- Rope Lanyard Rotation of the rope lanyard while inspecting from end to end will bring to light any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change from the original diameter. The rope diameter should be uniform throughout, following a short break-in period. Make sure the rope has no knots tied in it. Knots can reduce the strength of the rope by up to 60%.



- Shock-absorbing Lanyard Shock-absorbing lanyards should be examined as a web lanyard. However, also look for signs of deployment. If the lanyard shows signs of having been put under load (e.g. torn out stitching), remove it from service.
- Self-Retracting Lanyard/Lifeline The lanyard housing must be inspected to ensure that casing bolts are tight and that there are no loose fasteners, missing parts, cracks or excessive wear or corrosion.
- Webbing must be inspected for cuts, nicks or tears as well as for any broken fibers, stitching or fraying.
- **Steel Lanyard** Steel lanyards should be inspected for cuts, fraying, broken wires and overall deterioration and excessive wear.
- Fittings Fittings are to be inspected for wear or cracks and obvious damage.
- Follow manufacturer's recommendations for additional inspection tasks and for any requirements that the unit be sent in to the manufacturer for periodic inspection.



Appendix B – Annual Inspection sheet checklist

General Factors	Harness	Lanyard	Self-Retracting Line Synthetic Rope	Self-Retracting Line Wire Rope	Life Lines and Rope-Grabs	Clamps and Carabineers	Other
Note Serial Number						1	
If any part of the inspection	n is rejected, the	equipment fails a	nd must be taken	out of service and	destroyed		
1.) Hardware: Inspect for damage, distortion, sharp edges, burrs, cracks, and corrosion.	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected
2.) Webbing: Inspect for cuts, burrs, tears, abrasions, frays, excessive soiling and discoloration.	Accepted Rejected						Accepted Rejected
3.) Stitching: Inspect for pulled or cut stitches.	Accepted Rejected	Accepted Rejected	Accepted Rejected		Accepted Rejected		Accepted Rejected
4.) Labels: Make certain all labels are securely held in place and legible.	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected
5.) Energy Absorbing Component: Inspect for elongation, tears, and excessive soiling		Accepted Rejected	Accepted Rejected				Accepted Rejected
6.) Life-Line Rope: Inspect for pulled/cut yarns, burns, abrasion, corrosion, knots, broken wires and discoloration		Accepted Rejected	Accepted Rejected	Accepted Rejected	Accepted Rejected		Accepted Rejected



7.) Impact Indicator: Inspect indicator for activation (rupture of red stitching, elongated indicator)	Accepted Rejected				
8.) Housing: Inspect for distortion, cracks and other damage. Inspect anchoring loop for distortion and damage			Accepted Rejected	Accepted Rejected	Accepted Rejected
9.) Locking Action: Inspect for proper lock-up of brake mechanism			Accepted Rejected	Accepted Rejected	Accepted Rejected
10.) Retraction/Extension: Inspect spring tension by pulling lifeline out fully and allowing it to retract fully (no slack)			Accepted Rejected	Accepted Rejected	Accepted Rejected





Appendix C – Anchoring to the hook or load line of an overhead crane:

Safety and Health Regulations for Construction subpart 1926.1423(j)

A personal fall arrest system is permitted to be anchored to the overhead cranes hook (or other part of the load line) where all of the following controls are met:

Hierar	chy of controls checklist:		
1.	A qualified person has determined that the set-up and rated capacity of the crane (including the hook, load line and rigging) meets or exceeds the requirements; are that it complies with all other OSHA standards for fall arrest as well, as is the case when you are using any anchor point that is not a part of an engineered system.		
2.	A qualified equipment operator must be at the work location and informed that the equipment is being used for this purpose.		
3.	No load is suspended from the load line when the personal fall arrest system is anchored to the cranes hook (or other part of the load line); and under no circumstances is the crane to be used as a lifting device with personnel attached. The crane hook, under these circumstances, must be an anchor point only.		
4.	The cranes energy source has been locked out, tagged out and verified (a Safety Standard Operating Procedure must be written if the crane needs to remain in operation as a fall protection component).		
5.	Hook must be of positive latch type, and personnel must use a Self-Retracting Lifeline.		
6.	Provide a thorough THA, including the hazards, controls and authorizations that need to take place.		
7.	Training. The employer must train each employee who may be exposed to fall hazards while on equipment covered by this subpart:		
Persor	completing checklist: Date:		
Appro	ved by Safety (qualified person): Date:		



12.0 REVISIONS, REVIEWS AND APPROVALS:

Revisions and Reviews

Date	Revision #	Section	Description
3.9.2018	001	All	Format and review
9.5.2018	002	10.0 Rescue Plan	Review and edit rescue plans
8.20.2019	003	Appendix C	Overhead crane/ anchor point: OSHA's
			hierarchy of controls
7.29.2020	004	All	Review and edit with Signatures

Approvals

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