FALL SAFE®

USER INSTRUCTIONS FOR

SKYLINE™ HORIZONTAL LIFELINE SYSTEM

PERMANENT LIFELINE SYSTEM USING 3/8” – 7X19 STEEL WIRE ROPE WITH THE COMBINATION CLAMP AND THE SKYLINE™ SHOCK ABSORBER

Model # 6300

US Patent #6,338,399 and other Patents Pending

SureWerx®

FALL SAFE®
Ph. 1-800-323-7402

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SureWerx, 49 Schooner St.
Coquitlam, BC V3K 0B3

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IMPORTANT INSTRUCTIONS!

These instructions must be kept on file and available for the users reference at **all** times. The users must read and full understand these instructions or have the instructions explained in detail before using this equipment. **Failure to observe these instructions could result in serious injury or death.**

Prior to use, all workers must be trained in the proper use of all systems and equipment.

A Training and Instruction review should be repeated at regular intervals.

A rescue plan must be prepared; the workers must be trained in its use, and rescue equipment must be on hand prior to any use of this horizontal lifeline system.

Any questions regarding these instructions should be directed to:

Manufacturer's Name and Address

Fall Safe®
Canada labels
SureWerx, 49 Schooner St.
Coquitlam, BC V3K 0B3

USA labels
SureWerx USA Inc.
Elgin, IL USA 60123

IMPORTANT OSHA REGULATIONS COVERING THE USE OF HORIZONTAL LIFELINE SYSTEMS

OSHA 1910.66 Subpart M – 1926.502 (d)(8):

Horizontal Lifelines shall be designed, installed, and used under the supervision of a qualified person as part of a complete fall arrest system, which maintains a safety factor of at least two.

OSHA 1910.66 (b):

"Qualified Person" means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation, and specifications in the subject work, project, or product.

OSHA 1910.66 (b):

"Competent Person" means a person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment

OSHA 1910.66:

Personal fall arrest systems shall be rigged such that an employee can neither free-fall more than 6- ft. nor contact any lower surface.

OSHA 1910.66 (n):

The sag in the lifeline should be minimized to prevent the connecting piece of equipment (self-retracting lanyard or other appropriate personal fall arrest device) from sliding down the lifeline to a position which creates a swing hazard during a fall arrest.

OSHA Standards, Interpretations and Compliance Letters, 02/09/1995-Criteria for personal fall arrest systems:

The free-fall distance is limited to 6 feet. The deceleration distance must not exceed 42 inches; lifeline elongation is not included in deceleration distance; and the total fall distance is unregulated except that the employee cannot make contact with a lower level...The safety factor of two should be applied based on the anticipated maximum arrest force, not the fall energy.

SYSTEM DESCRIPTION

The Skyline™ Permanent Horizontal Lifeline System #6300 is designed for use as a permanently installed horizontal lifeline system. It is constructed exclusively of 3/8 – 7x19 wire rope and is available in both carbon steel (IPS) and stainless steel versions. It is designed to enable the user to attach to end anchorages or erected tubular steel stanchions in work areas where no overhead anchor points exist. The system, in general, is designed for use by up to 4 persons at the same time, and can span distances up to 200-ft. However, span length and number of persons on the system determine input energy (and therefore, final line tension) and not all combinations of span lengths and number of workers are possible. The user must consult the manufacturer for exact system parameters for each installation, or in the event that the system is moved. System parameters are provided in the form of computer generated anticipated line tension and Minimum Required Clearance (MRC) data that is traceable to actual test results for each system installation.

The computer generated designs are prepared from verifiable test data and include a 2-ft. safety factor for Minimum Required Clearance, and a 2 to 1 Safety Factor over the minimum cable breaking strength for maximum allowable line tension.

This system design is predicated on the use of a full-body harness for the worker, double-action, single-locking snap hooks to attach to the lifeline, and a shock absorbing vertical lifeline or self-retracting lanyard (SRL) with 900 lb. maximum arrest force. Non-shock absorbing lanyards and retractables that do not have "slip-clutch" type internal 900 lb. MAF shock absorbers are **NOT** allowed for use as vertical lifelines on this system. Any attachment to the horizontal lifeline must transfer fall arrest forces to the body through the dorsal d-ring of the full body harness only. Harness side and chest d-rings are not allowable lanyard connection points.

All Skyline™ HLL systems are supplied with an integral shock absorber in the line and no system may be used without one. The four main functions of the shock absorber are:

1. It adds energy capacity to the system to increase the safety of short horizontal lifelines.
2. It creates mechanical hysterisis (friction) in the system to absorb rebound energy.
3. It decreases low sag angle amplification by controllably elongating the horizontal lifeline during a fall.
4. It allows the cable to be tuned (or pre-loaded to a higher initial line tension) to force the cable to absorb energy at a higher rate.

The shock absorber has a built in spring-loaded tensioner that indicates when the proper pre-tension has been achieved. Normally the pre-tension is set at 1000-lb. but may be changed for specifically designed applications.

When a system is installed, the pre-tension must be set according to the installation instructions. Not all systems are perfectly rigid; therefore, pre-tension may change over time. Prior to each use, the worker must check the pre-tension of the system and adjust it accordingly. When the pre-tension of a system is closely controlled, the fall distance and final line tension are easily predictable. Knowing that the pretension of a horizontal lifeline is set correctly is of utmost importance to the predictability and safety of the system.

ANCHORAGE POINTS

The strength of horizontal lifeline anchorage points must be at least two times the anticipated line tension. This strength must be certified by a qualified person and must be verifiable by either calculation or testing. Anchorage connectors must be selected carefully. Eyebolts should not be used if they will be loaded at an angle to their axis, unless the loads fall within design parameters for such use. Weld-on lugs should not be less than 1/2-in. in width and should not be made of steel with less than 50,000-PSI yield strength. The proper stress areas and weld areas must be calculated to assure proper safety. If in question, consult Fall Safe for proper design requirements.

HORIZONTAL LIFELINE SYSTEM COMPONENTS

The Skyline™ Permanent Horizontal Lifeline System #6300 consists of the following standard approved and compatible components:

- 1 ea. Model 6000 Skyline™ Shock Absorber (stainless steel)
- 2 ea. Model 6062 1/2-in. bow shackles (stainless steel)
- 1 ea. Model 6066 5/8-in. bow shackle (stainless steel)
- 1 ea. Model 6021 8-in. Rigging Screw (stainless steel)
- 1 ea. Model 6055 Combination Clamp
- 1 ea. Model 6082 Wire Rope Clip, 3/8-in. (stainless steel)

To complete the Skyline™ Horizontal Lifeline System a Fall Safe wire rope assembly must be used. The wire rope assemblies are available in galvanized or stainless steel and are constructed of 3/8-in. 7x19 XIPS wire rope. **NOTE:** Only Fall Safe wire rope assemblies may be used with the Skyline™ Horizontal Lifeline; failure to use a Fall Safe wire rope assembly could result in injury or death.

- 1 ea. Model 6070-length of cable; 3/8-in. – 7x19 galvanized wire rope

or

- 1 ea. Model 6072-length of cable; 3/8-in. – 7x19 stainless steel wire rope

Bypass option may require one or more of the following (for some lifelines over 20 feet in length):

- Model 6150 12" Bypass Stanchion
- Model 6166 Cable Bypass for rebar
- Model 6167 Weld-on Bypass bracket
- Model 6152 60" Bypass Stanchion, 2" square steel tube
- Model 6176 72" Bypass Stanchion, 2" square steel tube

The final 2 Bypass stanchions Models 6152 and 6176 will also require a receiver to attach the stanchion to the walking/working surface. The receiver options are as follows:

- Model 6154 Weld-on Hitch tube receiver
- Model 6240 Beam Clamp Stanchion Receiver

The actual selection of components and options for the design of a horizontal lifeline system should only be performed by a Fall Safe Qualified Person, or a state registered Professional Engineer who is experienced in the design and use of safety systems.

The Skyline™ Horizontal Lifeline system is designed for use with the approved, above listed components only. Substitutions or replacements with non-approved components will endanger the system integrity and may affect the safety and reliability of the total system.

PERSONAL FALL ARREST EQUIPMENT USED WITH HORIZONTAL LIFELINES

It is of utmost importance in the design of horizontal lifelines to be able to predict the vertical fall arrest forces that will be imposed on a lifeline during a fall. Normally the lifeline will elongate under increasing tension until the horizontal lifeline imposes a 900-lbf. vertical force on the shock absorbing lanyard and then the lanyard will begin to rip out (or extend in the case of a SRL) until all of the fall energy has been absorbed. For multiple persons this force increases as a multiple of 900-lbs. The shock-absorbing lanyard, therefore, is vital in predicting and limiting horizontal lifeline tension. Only shock absorbing lanyards (or SRLs) with 900 lb. maximum arrest force are allowed for use with this system.

Care should also be used in selecting harnesses for use with horizontal lifeline systems. Due to the HLL sag height, additional distance required for clearance when using horizontal lifeline systems is often the limiting factor in determining whether a HLL system can be used for a particular application. Harnesses with sewn down back pads can limit as much as 1 ft. of back pad slippage during fall arrest, giving additional clearance for safety. If the system will be used where a worker could encounter a head first free-fall, a non-secured back pad can slide down the webbing to the small of the back, allowing the worker to fall out of the harness through the top by allowing the harness straps to slip over the shoulders. For this reason, we recommend the use of full body, crossover or pullover type harness with sewn down or slip resistant back pads for all installations.

INSTALLATION LAYOUT CONSIDERATIONS

Most HLL installations consist of either single-span or multi-span systems. Single-span systems consist of two end anchorages with a single HLL lifeline attached between them. Multi-span systems consist of two end anchorages and multiple intermediate (bypass) supports through which the cable passes, but to which it is not attached. Normally the bypasses consist of a structure that will allow a lanyard snap to pass through without allowing the cable to become disconnected. Input energy into an HLL system during fall arrest is usually determined by span length. The longer the span, the farther a person will fall during fall arrest and therefore, the greater the input energy. The more people that fall on a system at one time, the greater the falling weight and this also increases the input energy. In order to limit input energy into a system, one must limit the number of persons on a system and also limit the span length. On the other hand, the cable, having the greatest energy capacity (or ability to absorb energy) of all the components of a system due to its ability to strain under stress, must be long in order to absorb the greatest amount of energy. Therefore, the safest

way to rig and assemble a horizontal lifeline system is to use the longest cable length possible with bypass supports located to reduce sub-span length to as short as possible. Only minimum required clearance limits (MRC) should be used to determine maximum allowable line length.

INSTALLATION

Installation of horizontal lifeline systems should be done under the supervision of a Qualified Person trained in their function and use. Use only parts that have been qualified as compatible components by Fall Safe. Install the system only as specified in the system parameter documents prepared by the computer program system. Ensure that the minimum anchorage strength is at least 2 times the anticipated load called out in the system parameter documents. Have the anchorages certified by a qualified person and keep documentation on hand. HLL calculations for minimum required clearance (MRC) are measured below the walking/working surface and assume that the horizontal lifeline is at least 5 ft. above the walking/working surface (unless otherwise specified) in order to limit free-fall to 6 ft. or less as required by OSHA. Always install lifelines horizontally where all end anchorages and bypass supports are at the same elevation. Always install the system per the system parameter documents and NEVER change span length, sub-span length, or number of people allowed on the system once the system is designed and certified. Remember, horizontal lifeline dynamics change with any changes to span length, or number of people allowed on the system. Any changes require a new design, and MUST be approved by a qualified person.

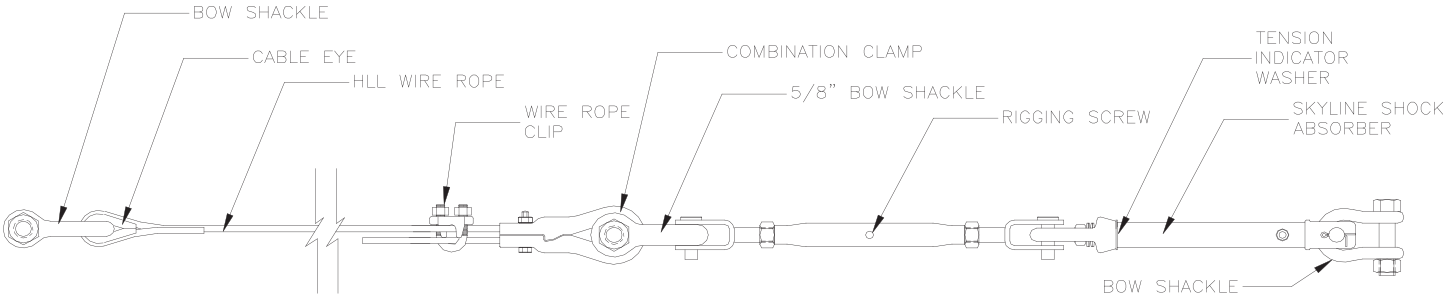


Fig. 1 Permanent system layout

(Note: The Lifeline Identification Tag, which is normally attached to the rigging screw, is not shown above for clarity.)

Skyline Horizontal Lifeline System Calculations

Project # (20 digits max.):	Sample Calculation ONLY!				
Job # (20 digits max.):	For Demonstration				
Lifeline # (20 digits max.):	Purposes.				
	Number	(units)			
HLL Line Material:	.375_7x19_IPS_Wire_Rope				
Initial line pre-tension:	1000	lbf			
Total Span Length(<=200 ft.):	100	ft.	Initial sag: (IS), under tension,in individual subspan:		
Number of subspans:	5		IS=	0.012 ft.	0.146 in.
Number of persons on HLL(1-4):	4				
Vertical Lanyard type(SRL or LAN.):	SRL_900MAF		Total Elongation at Final Line Tension, (TE):		
	0		%el:	0.401 %	
Lanyard Extension Length:	0	ft.	line el:	0.401 ft.	4.814 in.
Anchorage Elevation of HLL(AE):	6	ft.	strain:	0.004 ft/ft	0.048 in/ft
Length of subspans:	20.0	ft.	TE=	0.802 ft.	9.624 in.
# of end supports:	2				
# of center supports:	4		HLL Drop Distance, (HDD):		
Free fall distance, (FFD):	3.83	ft.	HDD=	2.848 ft.	34.178 in.
Shock Absorber Extension, (SAE):	2.24	ft.			
True Line Length Under Initial Pre-Tension:	100.000	ft.	HLL Sag Height, (SH):		
Expected Final Line tension:	3825	lbs.	SH=	5.988 ft.	71.854 in.
Final Vertical Lanyard Length:	1.583	ft.	Minimum Required Clearance, (MRC):		
			MRC=	-8.680 ft.	-104.157 in.

NOTE: The Final Line Tension and Min. Required Clearance numbers are certified traceable to test results by FallTech Engineering. Only Shock absorbing lanyards and SRL's with 900 lbs. MAF shock absorbtion may be used. This sheet makes no claim to determining whether a Skyline HLL System is right for a particular application or situation. LIABILITY DISCLAIMER: This system is for the exclusive use by, or under the supervision of a 'Qualified Person' in Fall Protection per Federal OSHA definition, CFR 1910 & 1926. Certification of anchorage strength shall be the responsibility of the customer and must be certified by a Registered Professional Engineer, qualified in Fall Protection.

Fig. 2 Computer Generated System Parameter Document

HLL INSTALLATION PROCEDURES

NOTE: Approved fall protection must be worn during Skyline™ lifeline installation at all times. Do not use the horizontal lifeline or its anchorages as personal fall protection anchorages until the system has been completely installed, inspected, and approved for use by a Qualified Person.

1. Installation of the Skyline™ horizontal lifeline begins with the placement of the end anchorages. Follow the "Installation Instructions" for the specific end anchorage for your system. Once the end anchorages have been installed per the manufacturers' or Qualified Persons' instructions, inspect the supports for soundness and stiffness. Verify that the anchorages will support at least 2 times the anticipated load.

2. If using bypass stanchions and receivers, install according to the prepared lifeline diagram following the "Installation Instructions" for the bypass stanchion.

3. Using a tape measure, determine the distance between the anchorage hole locations.

4. Layout the cable on a flat surface and remove all bends. Inspect cable for crush spots, broken wires, weld strikes, or any other deformity that may affect the integrity of the cable. Damaged cables must be removed from service immediately.

5. Install the jaw end of the rigging screw to the 5/8" bow shackle.

6. Lubricate the threads of the rigging screw with a heavy oil or grease and adjust the rigging screw until it is approximately 15 inches in length (i.e. adjusted half way out)

7. Install the eye end of the shock absorber to the jaw end of the rigging screw.

8. Install the Combo Clamp to the free end of the HLL cable and then adjust its' position to obtain the required horizontal lifeline length. Once properly located, tighten the Combo Clamp bolts evenly to 45 ft.-lbs. On the free end of the cable coming out of the Combo Clamp, install 1 wire rope clip with the wire rope clip saddle over the live end of the cable and torque the U-bolt nuts of the clip to 35- to 40 ft.-lbs.

9. Now adjust the rigging screw to its fully extended position, which is approximately 18 inches.

10. Install ½" bow shackles to each end of the cable assembly.

11. Lift the horizontal lifeline cable assembly to its intended position and install each end with a bow shackle. Tighten the bow shackle bolts and secure with the lock nut or cotter pin.

12. Tighten the rigging screw until the line tension just releases the indicating washer to spin free, located just under the eye of the shock absorber. This indicates that the cable has been pre-tensioned to 1000 lbf.

13. Once the proper tension is achieved, tighten the locking nuts that are on the rigging screw threaded shafts.

14. Inspect the installation for any defects, such as missing parts, damage, proper anchorage strengths and configuration, proper pre-tensioning, proper cable alignment, proper elevation, defective or noncompatible components. DO NOT authorize system use if any defects or discrepancies are found. Check system installation parameters with system installation parameter documents to assure that the correct installation has been performed.

15. Once the system passes all checks by the competent person, the system may be approved for use, and labeled with a permanent identification tag referencing the following information:

a. Identification number that will tie the lifeline to the correct computer generated design documents that identify the original design parameters.
b. Date of installation.
c. Total authorized span length and sub-span length.
d. Total number of people allowed on the system at one time.
e. The type of personal fall arrest system to be used to attach to the lifeline (SRL or shockabsorbing lanyard).
f. The length of drop cables being used, if applicable.
g. The anticipated maximum line tension.
h. Any other information or restrictions deemed pertinent to the operation of the lifeline.

16. The best manner for attachment of the ID tag is by plastic zip ties (electrical cable ties) that affix the tag to the rigging screw. The tag is secured by running the zip tie through both clevis ends of the rigging screw



and then passing it through the hole in the tag, then pulling it tight. Once the ties have been pulled tight, the excess ends may be trimmed off. Should the rigging screw ever come loose and begin to lengthen, the ties will break, releasing the tag, indicating that the lifeline needs to be examined and re-tensioned. Upon re-tensioning, the tag would need to be reattached.

17. A separate tag should also be added indicating date of last inspection by the competent person.

TRAINING

It is the responsibility of the employer to train all workers prior to using this system (per OSHA 1926.503 (a)(1)). The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.

The employer shall assure that, as necessary, each employee has been trained by a competent person qualified in the following areas:

a. OSHA regulations governing the use of horizontal lifelines.
b. Ability to recognize potential fall and workplace hazards.
c. Method of inspection of safety equipment.
d. Rescue procedures.
e. Installation and removal techniques.

PLANNING FOR RESCUE

Prior to system use, a rescue plan must be prepared, the workers must be trained in its use, and the rescue equipment must be on hand to implement it in case of a fall.

Typical rescue plans include (but are not limited to) the following items:

1. List of equipment that must be readily accessible in the event of an emergency and the names of those workers certified to use or operate that equipment.
2. Emergency contact phone numbers (ambulance, hospital, fire department...) and a means to contact them (cell phone, emergency radio).
3. List of employees on the site, and the specific tasks they will perform to effect the rescue.

The equipment that will be used to aid in the rescue of any worker must be attached to structural anchorages independent of those used for the horizontal lifeline system. During installation of horizontal lifeline anchorages, tie-off and equipment attachment hardpoints should be attached, and also clearly marked in such a manner as to provide a means to rescue a worker in any position along the lifeline system.

INSPECTION

Prior to each use, the worker must inspect the system for any physical damage, wear, corrosion, or malfunctioning parts. Check the shock absorber for deployment by looking to see if the black slide bearing under the shock absorber eye is exposed. Once the shock absorber is deployed, its energy capacity is used up, and it cannot be reset. If the shock absorber deploys, the entire system has seen a fall arrest load and must be removed from service until it is inspected by a competent person who either replaces or repairs and re-certifies the components for use on the system. Once deployed, shock absorbers are not re-usable, and must be replaced. If an inspection reveals a problem or unsafe condition, remove the entire system from

service until it can be re-certified by a competent person.

The worker should verify the presence of the Lifeline ID tag attached to the rigging screw. This tag attached to the clevis ends of the rigging screw helps verify that the rigging screw is the same length as when the system was first tensioned. Had the rigging screw loosened and become longer, the cable ties would have broken, releasing the tag. The presence of the tag does not eliminate the need for a regular inspection of the lifeline tension, however. The lifeline still requires regular inspection by a Competent Person to verify proper line tension and function.

The worker, who must also check the pre-tension prior to each use, must inspect all system components. A formal inspection must be carried out a minimum of once each year, and be formally documented and kept on file with the system parameter documents.

SERVICING

A qualified person trained in the inspection and servicing of system components must carry out servicing of this system. The company's safety officer should maintain a record log of all servicing and inspection dates. The system and all components must be withdrawn from service if subjected to fall arrest forces. Those components may be returned to service only after being certified by a qualified person. Only original Fall Safe equipment and replacement parts are approved for use in this system. Contact Fall Safe with questions and when in need of assistance.

WARNINGS AND LIMITATIONS

Proper care should always be taken to visually scan the work area prior to use. Remove any obstruction, debris, and other materials from, and beneath the work area that could cause injuries or interfere with the operation of this system. Be cautious of swing fall hazards if working horizontally to the side of the lifeline. Always use the shortest lanyard length possible to connect to the lifeline. Be aware of the movements of others on the lifeline at the same time, knowing that if they fall, the sudden motion in the lifeline could pull others off balance. When working at a fixed area, tie off to other suitable overhead anchorages if they exist, allowing the lifeline to be occupied by fewer people.

Users should be familiar with pertinent regulations governing the use of this system and its components. Only trained and competent personnel should install and supervise the use of this system.

Do not exceed manufacturers' recommended span length or maximum number of people on the same lifeline as listed on either the tag attached to the specific horizontal lifeline system, or in the lifeline parameter data sheets.

Do not use these components with any other horizontal lifeline material. Only 3/8 – 7x19 IPS or stainless steel wire rope is allowed, due to its high-energy capacity.

Use only Fall Safe supplied or qualified compatible components.

If you have any questions regarding the correct installation or use of this product DO NOT USE. Call Fall Safe at Ph. (303) 424-8650 or Fax (303) 424-8670.

INSPECTION LOG FOR HLL SYSTEMS

Company: _____ Location:_____ Date:_____

Job Site: _____ HLL Log No.: _____ System No.: _____

Is this system used as described in the HLL Log No. _____ to conform to design document criteria?_____

Describe non-conforming conditions in the boxes below:

Inspection Criteria	Missing Parts	Labels Readable	Corrosion	Deformed Parts	Cracked Parts/ Broken wires	Excessive Loading
HLL Identity Tag?						
HLL Shock Absorber Label?						
HLL Shock Absorber?						
Rigging Screw?						
End fittings?(combo clamp, etc.)						
Shackles?						
Wire Rope?						
Webbing Strap?						
Ratchet Tensioner?						
Load Rings?						
Anchorage Lugs?						
Bolted Anchor Clamps?						
Stanchions?						
Stanchion Receivers?						
Tie Back Straps?						

Is Shock Absorber pre-tension set correctly _____

Has a Rescue Plan been prepared?_____

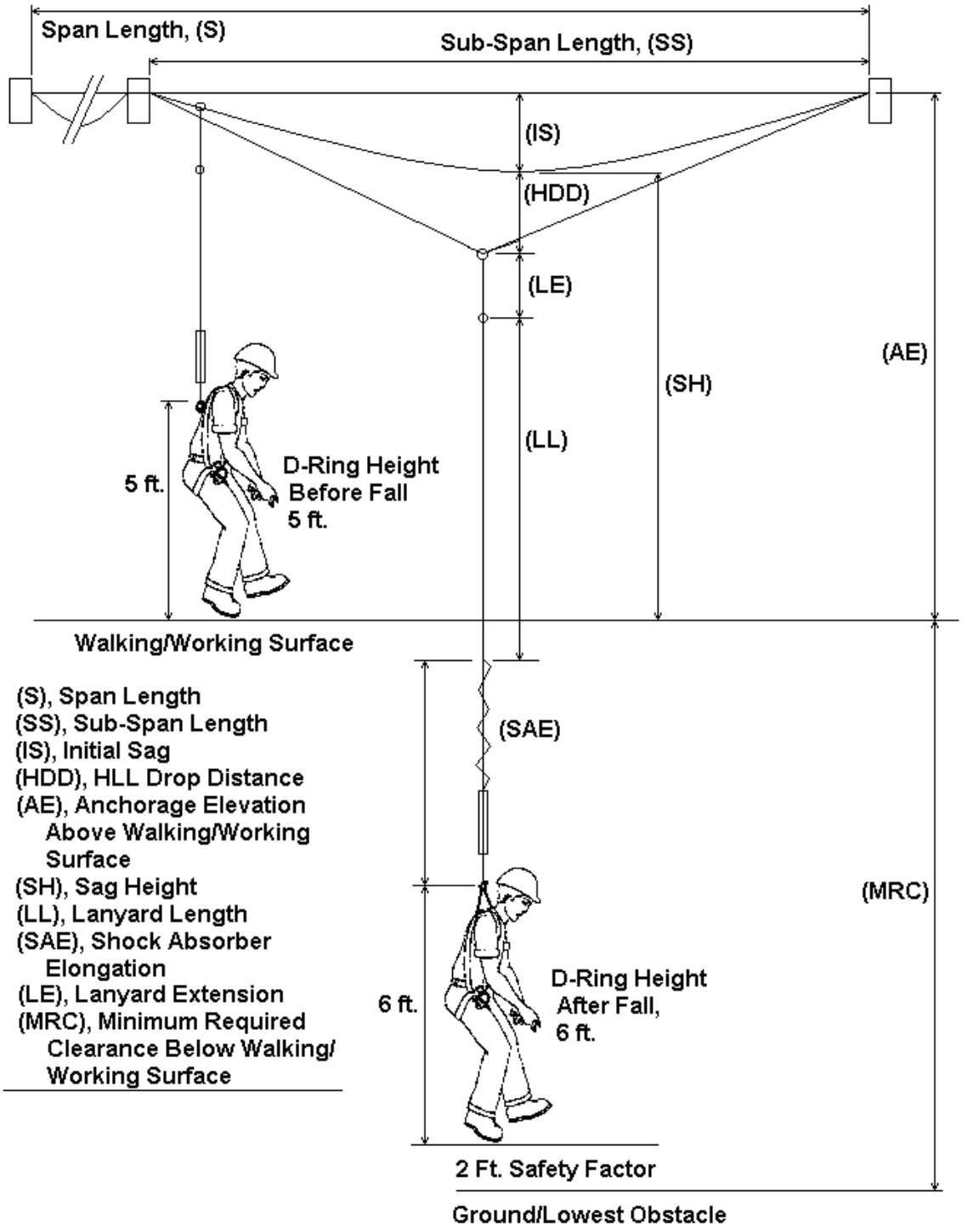
Is Rescue Equipment on hand?_____

Have workers been trained in the Rescue Procedures and been given a copy of the Rescue Plan? _____

_____

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SKYLINE™ HORIZONTAL LIFELINE DIAGRAM





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