FLEXIBLE LIFELINE SYSTEMS®
AT THE HEIGHT OF INNOVATION

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RECERTIFICATION or "Engineering Design Reviews"

Introduction

The ANSI Z359 Family of Standards are consensus standards intended for every employer to adopt and implement in order to provide the best practices to protect workers at height through the use of a managed fall protection program. The recertification process or the Flexible Lifeline Systems branded "Engineering Design Review" is a critical piece of this program that ensures that existing systems are both in compliance with the latest codes and standards, and continue to provide the highest level of protection to the workers at height. All systems designed by Flexible Lifeline Systems require an Engineering Design Review at least every five years. This is shown in the fall protection notes.

Definitions - ANSI Z359.0-2012 Definitions and Nomenclature Used for Fall Protection and Fall Arrest

The following definitions are taken from the above referenced document:

2.21 Certification. The act of attesting in writing that the criteria established by these standards or some other designated standard have been met.
2.22 Certified. An act or process resulting in documentation that determines and attests to criteria that meet the requirement of an American National Standard. Such act or process may be carried out by testing or applying proven analytical methods, or both, under the supervision of a qualified person or entity.
2.59 Fall Arrest System. The collection of equipment components that are configured to arrest a free fall.
E2.59 A fall arrest system is typically comprised of components such as full body harnesses, lanyards, deceleration devices, horizontal lifelines, vertical lifelines, anchorages and anchorage connectors. Configured and used properly, a free fall will be arrested without exceeding the strength requirements of these standards.
2.130 Qualified Person. A person with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating and specifying fall protection and rescue systems to the extent required by these standards. **E2.130** Many jurisdictions require that individuals who design or evaluate physical structures be registered with the jurisdiction as a professional engineer.

Codes and Legislation

The design of personal fall protection systems is governed by Legislation in the United States. OSHA **1926.502(d)** and **OSHA 1910.140** describe the requirements for "Personal Fall Arrest Systems". They also define the inspection requirements and frequency. The way that the OSHA requirements are written implies that the systems must always be in compliance with the most current edition of OSHA as well as the most

current edition of all other applicable codes and laws, however, OSHA does not provide a mechanism to ensure this other than through the inspection process which is not adequate for this task. Changes in the ANSI standards, building and design codes, hazards, tasks, users, personal equipment etc. can render the system no longer in compliance.

Standards and Best Practice

ANSI Z359 - The fall Protection Code addresses the issues of ensuring that fall protection systems are always in compliance through a recertification process that Flexible Lifeline Systems has branded as an "Engineering Design Review". **ANSI Z359.2-2017 Minimum Requirements for a Comprehensive Managed Fall Protection Program** in section **9.2.2** require that, "The design of permanent fall protection systems shall be based on the results of tests or predictive calculations made by a qualified person according to **ANSI/ASSE Z359.6**, **Specifications and Design Requirements for Active Fall Protection Systems**."

ANSI Z359.6-2016 Specification and Design Requirements for Active Fall Protection Systems in section **9.1 Certification of Active Fall Protection Systems** requires, "**9.1.1** The certification of an active fall protection system shall document the system's design, fabrication, installation, and use. The qualified person shall include with the documentation a written statement that the system meets criteria established by this and other referenced standards as applicable.", and "**9.1.2** The certification documentation shall state the frequency that the system shall be recertified by a qualified person. This frequency shall not exceed 5 years." The standard goes on to describe the Recertification as:

9.2.1 Active fall protection systems shall be thoroughly reviewed by a qualified person at the frequency specified in 9.1.2. The recertification shall include a review of the original certification documentation, prepared for the system and its continued applicability. Criteria for the recertification of an active fall protection system shall include, but not be limited to:

9.2.1.1 Changes in the hazards and tasks that are addressed by the system.
9.2.1.2 Changes in regulations, standards or other factors affecting the system.
9.2.1.3 Feedback from a representative sample of the authorized persons and competent persons who use the system.

In every jurisdiction in the United States there are laws and rules governing what tasks are defined as engineering and limiting the practice of those tasks to Licensed Engineers or to persons under the direct supervision of Licensed Engineers. In Texas, our primary State of operation, these laws are known as "Texas Engineering Practice Act". The most primary of which is the performance or review of engineering calculations. This means that the recertification must be performed by or under the direct supervision of a Professional Engineer that is also a qualified person.

PROCEDURE FOR SYSTEMS FULLY DESIGNED AND INSTALLED BY FLEXIBLE LIFELINE SYTEMS

It is internal policy that all Engineering Design Reviews be coupled with an annual inspection that is in compliance with all ANSI Z359 requirements. In addition to the annual inspection the field personnel must observe the systems in use if possible and fill out an Engineering Design Review Questionnaire with the system owner's representative. The questionnaire must be signed and dated by the owner's representative. They must also verify that the system is still installed exactly as shown on the as-built drawings. If the system is not installed as shown on the as-built set of drawings the technicians must document all of the changes. The technician must also fill out the applicable portions of the Engineering Design Review Field Checklist. The field personnel must be trained in the use of the Questionnaire, checklist and how to document changes to an existing system. A copy of the Engineering Design Review Questionnaire and the checklist are attached to this document. The Questionnaire is designed to gather the additional information required for a recertification as noted in 9.2.1.1, 9.2.1.2, and 9.2.1.3 in **ANSI Z359.6-2016**.

The project manager will gather the documents from the inspection, the questionnaire, the checklist, original drawings with noted modifications, original calculations, and any other pertinent information including previous repairs and combine these into a submittal to the Engineering and Design Department.

Engineering will review all of the information as required by **ANSI Z359.6-2016 9.2.1** for all of the requirements in **ANSI Z359.2-2017, ANSI Z359.6-2016,** and any other applicable sections of the ANSI Z359 Standards. The engineering design review will also verify that the systems, including the anchorages, are in compliance with all other applicable codes and standards including, but not limited to the International Building Code, ASCE – 7, ACI, AISC, NDS, and others. This process includes adding any new calculations required, updating the drawings to be in compliance with current standards, updating and reviewing any deviations found in the field, and re-evaluating the equipment in the system.

At the end of the EDR process FLS will issue a new set of drawings and calculations showing that either the existing system is in compliance with all current codes and standards, or showing what deficiencies are existing in the system that must be corrected in order to bring the system into compliance.

PROCEDURE FOR SYSTEMS DESIGNED AND INSTALLED BY FLS WITH STRUCTURAL ANALYSIS BY OTHERS

When FLS has a contract to perform an EDR on a system designed and installed by FLS but with the structural analysis performed by others the process is similar to a standard Engineering Design review, but with some changes. When FLS performs work without performing analysis on the structure we typically will provide a note on the drawings such as:

"FLEXIBLE LIFELINE SYSTEMS' SCOPE OF WORK DOES NOT INCLUDE ANALYSIS OF THE EXISTING STRUCTURE. THE WORST CASE LOADING CONDITIONS HAVE BEEN INCLUDED IN THIS SET OF DRAWINGS FOR USE BY THE ENGINEER OF RECORD (OR OTHER ENGINEER DESIGNATED BY THE CLIENT PROPERLY LICENSED IN THE JURISDICTION THAT THE SYSTEM WILL BE LOCATED) FOR THE PROJECT. THE ENGINEER OF RECORD MUST RESOLVE ALL THE PROVIDED LOADS AND PERFORM ALL REQUIRED STRUCTURAL ANALYSIS. THE ENGINEER OF RECORD WILL PROVIDE SIGNED AND SEALED DOCUMENTATION THAT THE STRUCTURE WILL SUPPORT THE REQUIRED FALL PROTECTION LOADS AT THE LOCATIONS SHOWN ON THE FALL PROTECTION DRAWINGS. COPIES OF THIS DOCUMENTATION WILL BE REQUIRED TO BE PROVIDED TO THE OWNER AND TO FLEXIBLE LIFELINE SYSTEMS. THIS DOCUMENTATION MUST BE SUBMITTED BEFORE FLS WILL PROVIDE ANY FALL PROTECTION PRODUCTS."

Or

"FLEXIBLE LIFELINE SYSTEMS WILL PROVIDE THE WORST CASE LOADS FOR THE CUSTOMER'S STRUCTURAL ENGINEER TO ANALYZE THE EXISTING STRUCTURE AND DETERMINE IF IT CAN SAFELY HANDLE THE LOADS. FLEXIBLE LIFELINE SYSTEMS' SCOPE DOES NOT INCLUDE ANALYSIS OF THE EXISTING STRUCTURE. SEE LOADS ON DWG. NO. X."

In order to do a re-certification of a system in this situation one of four things must occur:

1. We must have or obtain the design calculations from the original design engineer documenting that the anchorages are adequate to support, and review them for changes as noted previously.
2. Have the original design engineer, or another professional engineer as designated by the owner, prepare a new set of calculations based on the currently required design loads.
3. Prepare a set of design calculations for the project.
4. Decline to complete the project.

If we have, can obtain, or if an outside engineer prepares the calculations, once we have them the Engineering Design review can continue as outlined above. If we are preparing the calculations we will need to verify that we have all of the required structural information to do so. If we have the complete set of structural drawings we will need to verify that they are accurate during the site visit. If we do not have the required drawings, we will be required to perform a site visit. For simple projects the site visits may be performed by the Inspection Technicians, however, for more complex structures, Engineered Systems Project Manager may be required. The EDR project manager should consult with Engineering, the Program Manager, or the General Manager to make this determination. During the site visit the technician or project manager will be required to gather up all required information to perform a structural analysis of the existing structure. The information required is the same as would be required for a new system being installed in an existing system. The technician or

project manager should be familiar and trained on this process before being sent. If there are any unusual elements or questions the technician or project manager should meet with engineering before proceeding.

PROCEDURE FOR SYSTEMS DESIGNED AND INSTALLED BY FLS WITH STRUCTURAL ANALYSIS BY OTHERS OR SYSTEMS DESIGNED AND INSTALLED BY OTHERS

When FLS has a contract to perform an EDR on a system designed and installed by others the general process is the same as for a system that we designed and installed, however, we have to create all of the documentation.
An inspection is required. During the site visit we will have to gather sufficient information to create a full set of drawings and calculations. The site visit should typically be performed by a sales person or project manager. Every existing component will have to be identified. The structure and layout of the system will have to be sketched up in sufficient detail to draft and perform the required calculations. Technical data sheets must be found for the components. The Engineering Design Review Questionnaire will have to be executed. The Engineering Design Review field checklist will have to be filled out. Once all of the required information is gathered, the engineering group may proceed with the Engineering Design Review as outlined above.

ENGINEERING DESIGN REVIEW QUESTIONS:

1) Are there any changes in the hazards and tasks that are addressed by the active fall protection system(s)?

2) Are there any changes in the regulations, standards or other factors affecting the active fall protection system(s)? (Old style Karabiners, >5 year Webbing, etc.....)

3) Feedback from a representative sample of the competent person(s) and authorized person(s) of the fall protection system(s)

4) System(s) Elevation if not on current drawings

5) Elevation of working height

Owners Representative: _____ Date: _____
FLS Technician: _____ Date: _____

FLEXIBLE LIFELINE SYSTEMS®

TURNKEY PROVIDERS OF INNOVATIVE FALL PROTECTION SOLUTIONS

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Engineering Design Review Field Checklist

Client: _____ _____	Location: _____ _____ _____	Project #: _____	Date: _____
Technician: _____	Project Manager: _____	Engineer: _____	Checked By: _____

	General Items	Remarks or Notes:
1	Do you have a set of Existing Drawings?	
2	Read the drawings before you go to the site. Ask questions if you don't understand.	
3	Check every item on the drawings. Make note of all deviations.	
4	Check the height of every system.	
5	Check the height of the working level the full length of every system.	
6	Check for any obstructions that someone using the system may hit if they fall.	
7	Check to make sure the workers are not going outside of the cone of coverage.	
8	Make sure the original SRL or Lanyard is still in use. If not get brand and serial number.	
9	Talk to the users to get an idea of how the system is being used.	
10	Get Photographs if possible.	
11	Note any deteriorated components (more than just a light rust)	
12	Verify the number of users for each system or segment of each system	
	Measuring the Structure If Required	
1	Write a general description and make a sketch of the system.	
2	I need the dimensions of all members the system attaches to all the way to the ground.	
3	For structural members I need dimensions to the nearest 16th of an inch.	
4	For Frames / Gallows / Bays I need dimensions to the nearest 3" increment.	
5	I need the diameter and type of all bolts. Photograph or sketch the bolt heads.	
6	I need the brand and serial number of all components and the arrangement.	
7	I need the diameter and material of all cables and cable components.	
8	Make a note of any foundation visible including anchor bolts.	
9	Sketch the general arrangement of any steel connections including bolts and plates.	

Client:	Location:	Project No.	Sheet: of
Subject:	Engineering Design Review	By:	Date:

	Specifics Data For Gallows	Remarks or Notes:
1	Gallow height to bottom of beam from tracks and top of foundation	
2	Length of Gallow Arm from Center Line of Column to each Systems	
3	Height of cable or track above grade.	
4	Distance from Center of Track to Center of Gallow Column.	
5	Size and material of all bolts and anchor bolts	
6	Data on all system components.	
7	Check that all bolts are properly tightened. (Lock washer should be flat, 3 threads showing past nut)	
8	Condition of all system components	
	Interior Cable or Rail	
1	Bay Spacing.	
2	All member sizes of dops, bracing, and / or tiebacks.	
3	Size and material of all bolts and anchor bolts	
4	Height of cable or track above grade.	
5	Distance from Center of system to center of work area.	
6	Check that all bolts are properly tightened. (Lock washer should be flat, 3 threads showing past nut)	
7	Data on all system components.	
	NON-FLS SYSTEMS	
1	We typically should not be doing EDR's on Non-FLS systems without drawings. Verify with PM.	
2	Note all deviations from the existing drawings.	