DEPARTMENT OF LABOR AND INDUSTRY

MNOSHA Instruction **CPL 2-1.43**
July 9, 2013
Reissued in accessible format: March 23, 2022

SUBJECT: Slide-locks – Enforcement Policy, Inspection Procedures and Performance Guidance Criteria

Purpose:

This Instruction establishes enforcement policies, inspection procedures and performance guideline criteria for the safe design, construction, installation, testing, maintenance and use of slide-locks used for the control of hazardous energy on machinery.

Scope:

This Instruction applies MNOSHA-wide.

References:

1. 29 CFR Part 1910, General Industry Standards: 29 CFR 1910.147, Control of hazardous energy (lockout/tagout); 29 CFR Part 1910, Subpart O, Machinery and Machine Guarding.
2. American National Standards Institute; Safety Requirements for Mechanical Power-presses, ANSI B11.1 - 2001.
3. American National Standards Institute; Hydraulic Power-presses - Safety Requirements for Construction, Care and Use, ANSI B11.2-1995 (R 2005).
4. American National Standards Institute; Performance Criteria for Safeguarding, ANSI B11.19 - 2003.
5. American National Standards Institute; Control of Hazardous Energy – Lockout/Tagout and Alternative Methods, ANSI Z244.1-2003.

Cancellation:

This instruction supersedes CPL 2-1.43 Slide-locks – Enforcement Policy, Inspection Procedures and Performance Guidance Criteria, dated February 21, 2008.

Background:

Federal OSHA established its enforcement policy, inspection procedures and performance guideline criteria regarding slide-locks – i.e., when they are used for hazardous energy control purposes. Previously, Federal OSHA issued an interpretation letter prohibiting the use of slide-locks to replace safety blocks on mechanical power-presses (December 21, 1998, to Mr. David L. Thorpe). However, due to improved technology and requests for further guidance on the subject, Federal OSHA cancelled the referenced letter and issued this directive to further its goal of uniform enforcement of OSHA standards. MNOSHA is accordingly issuing this amended version of the Instruction to apply in Minnesota.

The Appendix to this directive addresses a set of best practices related to the design, installation, use, inspection, testing and maintenance of slide-lock devices. This performance guideline was developed by a work group of practitioners (the Automotive Industry Action Group and representatives from the United Auto Workers) having expertise in power-press operation and safety design.

Significant Points:

This Instruction provides guidance to MNOSHA enforcement personnel performing inspection activities related to the use of slide-locks on machines. Some of the significant points are:

- Establishment of inspection procedures for MNOSHA enforcement personnel to evaluate the safety of a machine using slide-locks as energy isolating devices;
- Inclusion of Safety investigator Safety guidelines; and
- Establishment of criteria for MNOSHA enforcement personnel to evaluate design, construction, installation, testing, maintenance and use of the slide-lock system.

I. Action.

Where it is necessary to place hands or other body parts into hazardous machine areas for servicing and maintenance purposes, practices and procedures are necessary to disable the machinery and control the hazardous energy source(s) while the work is being performed. The lockout/tagout standard requires, in part, machine shutdown and isolation, which includes the application of energy isolating devices (EID), defined by 29 CFR 1910.147(b) as a "… mechanical device that physically prevents the transmission or release of energy…" In particular, the OSHA standard for Mechanical power-presses, 29 CFR 1910.217(d)(9)(iv), requires employers to provide and enforce the use of safety blocks whenever dies are

being adjusted or repaired in the press. A safety block is, ***"… a prop that, when inserted between the upper and lower dies or between the bolster plate and the face of the slide, prevents the slide from falling of its own deadweight,"*** as defined by 29 CFR 1910.211(d)(48).

Another type of EID used for power-press energy isolation is the slide-lock***.*** *A slide-lock device* is a positive mechanical engaging device – i.e., a lock or block – that is capable of preventing the slide from closing of its own deadweight. [See the *Slide-lock device* definition in the Appendix and in the MIOSHA *Hydraulic Power-presses* regulation -- R 408.12311, Rule 2311(5)]. On December 21, 1998, OSHA issued an interpretation letter to General Motors which stated that slide-locks would not meet the mechanical power-press safety requirements contained in 29 CFR 1910.217(d)(9)(iv), and suggested that the use of slide-locks in place of safety blocks on mechanical power-presses was more appropriately addressed by a variance application. Since that time, OSHA has received variance applications for slide-locks as well as requests for additional guidance. This directive cancels the 1998 letter and establishes new policy concerning the use of slide-locks.

Safety blocks, slide-locks, locking pins or other mechanisms that physically prevent (block) the transmission of energy are energy isolating devices. As such, these isolating devices must be used in accordance with the requirements set forth in the *Control of hazardous energy* (*lockout/tagout*), 29 CFR 1910.147, standard. Slide-locks as well as safety blocks are usually designed and intended to address gravity hazards (deadweight or static forces) associated with the press slide and are not usually designed to withstand dynamic forces, such as a powered stroke of the slide. Therefore, it is imperative to prevent machine energization in cases where these dynamic forces expose employees to uncontrolled hazardous energy (such as unexpected press activation caused by human error).

Additionally, the American National Standards Institute recognizes, in their *Safety Requirements for Mechanical Power-presses*, ANSI B11.1 – 2001 and *Performance Criteria for Safeguarding*, ANSI B11.19 – 2003 standards, that safety blocks and other die/slide support means are designed to restrict hazardous motion but that their design and construction must not create a hazard to individuals due to broken or damaged machine components.

To assist employers in providing a safe workplace for employees using mechanical equipment, OSHA has reevaluated the use of slide-locks as energy isolating devices when used on mechanical power-presses (in place of safety blocks) and when used on other general machinery. This directive's appendix contains the *Performance Guideline Criteria for Slide-locks*, which includes design criteria addressing safety factor design. Safety investigators shall use the guidance material contained in this directive when evaluating the adequacy of slide-lock use as energy isolating devices.

II. Enforcement Policies and Procedures.

A. Safety and Health Investigators Safety.

As a matter of policy, MNOSHA prohibits routine exposure of Safety and Health Investigators (OSHIs) to hazards associated with the release of hazardous energy. Facility work areas involved in the inspection must be evaluated by the OSHI before entering such areas to determine whether there are any potential hazardous energy exposures.

OSHIs must take reasonable measures to avoid, diminish, or control exposure to hazardous energy when performing inspection activities. Exposure may be avoided by such inspection techniques as: 1) interviewing employees or management representatives in a safe location, 2) photographing from a safe location, and 3) using engineering or similar drawings in lieu of obtaining direct measurements. No OSHI may endanger him or herself at any time and appropriate precautionary measures must be taken based upon site evaluations and OSHI training. Conversely, ***OSHIs must avoid placing themselves in the danger zones of any machines or equipment if any practices or procedures are in use that are not compliant with the lockout/tagout standard.***

> ***NOTE: The Selection and use of work practices, 1910.333, applies to work on or near exposed energized parts when OSHIs are close enough to expose themselves to an electrical hazard. OSHIs may not approach any electric circuits or equipment unless they have received the electrical safety-related work practice training prescribed in 1910.332, and have determined that MNOSHA and the employer have complied with the requirements of 29 CFR 1910.333.***

B. Inspection Guidance.

Section 1910.217(d)(9)(iv) requires the use of safety blocks when dies are adjusted or repaired in mechanical power-presses to protect employees from the potential mechanical energy hazards associated with the working area of a power-press. Employers who provide and enforce the use of slide-locks that meet the performance guidance criteria contained in this directive will not be cited with respect to the 29 CFR 1910.217(d)(9)(iv) safety block provision and will be considered as meeting the Energy isolating device definition in the lockout/tagout standard.

The following inspection guidance, together with the criteria contained in the Appendix, shall be used in evaluating slide-lock design, construction, installation, testing, use and maintenance for the purpose of determining whether slide-locks provide a level of protection equivalent level to safety blocks:

1. Scope and Application.

This directive provides guidelines on slide-locks that are used on mechanical and hydraulic power-presses in general industry. Slide-locks may be used on other types of machinery. In rare cases,

non-interlocked manual type slide locks may be used. The performance guideline criteria contained in this Instruction may or may not be applicable to those types of slide-locks. Where slide-locks are used on machines other than hydraulic and mechanical power-presses, or where manual type slide-locks are used, safety investigators should apply appropriate reference material, such as the original equipment manufacturer (OEM) specifications/instructions and any applicable parts of this directive, to determine whether slide-locks are being utilized in accordance with recognized good engineering practice for that particular piece of equipment.

Also, the *Control of hazardous energy (lockout/tagout),* 29 CFR 1910.147, standard applies to the use of slide-locks because they are energy isolating devices. Slide-locks are mechanical blocking devices that protect workers from hazardous (mechanical) energy while they are performing servicing and maintenance work, such as die set-up, adjustment, cleaning, or repair.

2. Employer and Equipment Manufacturer Responsibility.

The employer (owner/operator) is responsible for the proper installation, inspection, testing, maintenance and use of machine slide-lock systems. OSHIs generally should not cite an employer for slide-lock design and construction deficiencies if they exercised reasonable diligence to have the slide-lock system designed, constructed, and installed in accordance with recognized good engineering practice, such as the performance guideline criteria contained in the Appendix. OSHIs may, however, cite employers when an employer has not exercised reasonable diligence and/or his or her slide-lock system presents a serious safety hazard. Refer to Section II.C for citation policy.

Where employers delegate their responsibility, such as for slide-lock maintenance, to OEMs or contracted engineering firms the employer still has an obligation to monitor and ensure that the outside personnel's actions are adequate to meet the OSHA requirements and recognized good engineering practices. OEMs, architects, engineering firms and other entities should produce a slide-lock system in accordance with recognized good engineering practice so that the isolating device effectively and reliably controls the hazardous energy associated with the machine. Failure to do so may create hazardous conditions through inadequate slide-lock design, construction or installation. However, OSHIs generally shall not cite these entities for slide-lock system design, construction, and installation issues, except if the entities had employees on site and exposed to a hazard. It is the ultimate responsibility of the employer using slide-lock devices to exercise reasonable diligence to discover hazardous conditions and to take steps to protect its employees.

3. Evaluations of Compliance.

Compliance with this Instruction shall in no case replace compliance with any relevant OSHA standard, such as 29 CFR 1910.147 or 1910.217. Evaluations shall be conducted whenever slide-lock use is discovered during inspection activities.

4. Minor Servicing Exception.

When evaluating slide-locks in accordance with lockout/tagout requirements, OSHIs must determine whether the employer's work activity meets the minor servicing exception. See the 29 CFR 1910.147(a)(2)(ii) note. The lockout/tagout (LOTO) standard is not intended to cover certain minor servicing activities which are necessary to carry out the production process, provided that all of the criteria detailed in the exception are met. Minor tool changes and adjustments, and other minor servicing operations which take place during normal production operations, are **not** covered by this standard if they are routine, repetitive, and integral to the use of machines or equipment for production, and if work is performed using alternative protective measures that provide *effective employee protection*. LOTO is not required when each of these elements exists and employees may perform servicing and maintenance activities with the machine or equipment energized.

Nonetheless, the exclusion from LOTO does not mean that the employer can avoid providing employee protection even though employees carry out these minor servicing tasks with the machine or equipment energized. Rather, in order to take advantage of the ***limited exception***, an employer must provide effective alternative protection instead of lockout/tagout.

> NOTE: The previously referenced national consensus standards for machine tools (ANSI B11.1-2001 and ANSI B11.19-2003) permit control-circuit means, such as interlocked safety blocks, to prevent actuation of hazardous (dynamic) motion. Regardless, electrical interlocks and other control circuits may not be used exclusively to control hazardous energy during servicing and maintenance operations covered by OSHA's *Control of hazardous energy (lockout/tagout) standard,* §1910.147. Pursuant to 29 CFR 1910.147(b), control circuits are not, by definition, energy isolating devices. However, electrical interlocks and other control circuits, which meet the American National Standards for Machine Tools, *Performance Criteria for Safeguarding* (ANSI B11.19-2003) control reliability provisions, may be used in conjunction with slide-locks and in lieu of other energy isolation devices to provide effective alternative employee protection for servicing and maintenance activities that meet each of the elements in the lockout/tagout standard's *minor servicing exception*, 29 CFR 1910.147(a)(2)(ii)(Note).
>
> In terms of minor press activities, such as minor cleaning, minor adjustment or minor repair of dies in the press, effective alternative protection will be considered by OSHA to be provided if employers meet the electrical performance criteria contained in Section 4.2 of the Appendix – i.e., if properly applied control circuits are used in conjunction with other necessary control measures (e.g., shutting off the press drive motor; deactivating the clutch/brake mechanism or trip control system; dissipating residual energy by waiting for the flywheel to stop; actuating the electro-mechanical slide-lock device that consists of a control-reliable electrical system or removing the interlocked safety blocks from the press, and inserting the safety blocks in the working area of the press to prevent hazardous slide motion.).

5. Documentation.

This directive does not require additional documentation other than that already required by other standards -- e.g., energy control (lockout/tagout) procedure documentation, as required by 29 CFR 1910.147(c)(4). However, in the event that deficiencies are identified, the OSHI must document the associated hazards in accordance with established policy contained within the Field Compliance Manual.

Additionally, some employers may retain slide-lock design specifications from the original manufacturer's instructions, training records/certifications and other documentation regarding slide-lock installation, testing (both initial and periodic), inspection, use and maintenance. Where available, these documents should be used by the safety investigator to determine if the slide-lock program is equally as effective as safety blocks. Nonetheless, the OSHI shall evaluate slide-locks in accordance with this directive, its appendix and with the specific requirements of the OSHA standards.

The following screening questions provide a general framework to assist OSHIs in evaluating documentation associated with a slide-lock:

a. Who designed, constructed and installed the slide-locks: the employer, an OEM, or an engineering contractor? Does the installer possess adequate expertise to properly design, construct and install the slide-lock system? Were the slide-locks designed and constructed in accordance with recognized good practice and installed as per the manufacturer's instructions?

b. Did the employer perform a formal hazard analysis (risk assessment) for foreseeable hazards – e.g., the determination of the slide-lock's rated load (maximum use) capacity? If so, does the analysis apply general recognized good engineering practice, such as the criteria contained in the Appendix?

c. Does the slide-lock use a safety factor of at least 2.0 – i.e., based on the maximum anticipated load definition contained in Section 3.1 of the Appendix? If the employer designed and installed the slide-locks, how was the safety factor determined and does it consider reasonably foreseeable dynamic forces? What information did the employer provide to the designer and installer of the slide-locks? Is the safety factor legibly marked on the slide-lock?

d. Has anyone modified the slide-locks from the original installation? An employer who has or has had a slide-lock device modified from its original design and installation must be capable of assuring that the modifications provide a safe level of performance.

e. Does the employer have a mechanical integrity program for the slide-locks? Are the slide-locks inspected and tested in accordance with Section 8 of the Appendix? Does the employer perform preventive maintenance? How are defective or damaged slide-locks identified and removed from service? Who performs the maintenance and repair of the slide-locks? Who performs testing of slide-locks?

f. Has the employer developed, documented, and implemented an energy control procedure that includes specific procedural steps for shutting down, isolating (e.g., applying the slide-lock isolating device(s); opening the press electric disconnect), and securing machines to control hazardous energy during servicing and maintenance activities? Does the energy control procedure outline the steps to release lockout/tagout as well as the sequence of action to be taken to test or reposition a press component so that the employee(s) is protected from the press point-of-operation hazards?

6. Evaluation of Slide-lock Operation.

The following considerations may be used to evaluate slide-lock use:

a. Are point-of-operation guards or safety devices used to complement lockout/tagout to protect employees during machine testing, machine component repositioning or other activities such as setting up the press?

NOTE: OSHA's Mechanical power-presses standard, 29 CFR 1910.217 (d)(9)(i), requires employers to develop a procedure that ensures that an employee is safeguarded from the point-of-operation hazards during die-setting activities. Thus, a mechanical power-press die-set procedure would need to clearly and specifically outline both the point-of-operation safeguarding methods (e.g., use of a two-hand control device to position the slide) and the hazardous energy control (lockout/tagout) steps necessary to control employee exposure to hazardous areas of the machinery – i.e., pursuant to the requirements contained in 29 CFR 1910.147(c)(4) and 1910.217(d)(9), respectively.

b. On mechanical power-presses, does the employer properly de-energize the hazardous energy before engaging the slide-lock – i.e., shut off the press drive motor and its control system; deactivate the clutch/brake control or trip control system; wait for the flywheel to stop?

c. Is the slide-lock interlocked with the machine control to prevent actuation of slide motion during work activities – i.e., for minor servicing tasks that meet the minor servicing exception contained in the lockout/tagout standard? Are all electrical control components that actuate and monitor the slide-lock position designed and installed using a control-reliable system? See Section 4.2 of the Appendix.

d. Are there at least two independent visual means of verifying slide-lock engagement (i.e., isolation of the mechanical energy created by the slide)? Some slide-locks can be verified as engaged by visible means from the slide-lock operation point (e.g., the slide-lock can clearly be seen as engaged) while others may use a control-reliable indicator light. In both cases, a second visual verification must be provided.

e. Do employees visually verify that the slide-locks are in place before accessing the hazardous area? Does the energy control procedure require the verification of isolation and de-energization (e.g., pushing a press start button and visually checking that the disconnect switch handle is in the off or open position) of other energy sources, such as electric disconnects?

f. On hydraulic power-presses, are electric disconnects used to isolate the electrical energy source or, in case of the minor servicing exception, are properly applied electrical interlocks used as effective protection to prevent hazardous motion? See the note in Section 4.2.3.1 of the Appendix for more detail on the coordination of slide-lock use and the lockout/tagout standard.

g. Does each employee performing the servicing and/or maintenance exercise personal control over the slide-lock and other energy isolating devices through the application of personal lockout/tagout devices? See 29 CFR 1910.147(d)(4) and (f)(3) as well as Section 6 of the Appendix for guidance on personal control criteria.

h. Does the slide-lock create any additional hazards, due to broken or damaged machined components, pinch point, projectile or ergonomic hazards?

7. Training Program Evaluation.

A training program must ensure that employees who use slide-locks (i.e., as an energy isolating device) are instructed in the safe working procedures and are qualified to safely perform the functions to which they are assigned. Employees who implement the energy control procedures (e.g., when an employee is to use a slide-lock for energy isolation purposes) or perform the servicing/maintenance activities, are, by definition, *authorized employees*. Pursuant to 29 CFR 1910.147(c)(7), these employees must have the knowledge (e.g., methods and means necessary for energy isolation) and skills necessary for the safe application, usage, and removal of the energy controls -- e.g., how to engage and disengage slide-locks; how to verify that slide-locks are engaged.

At a minimum, the hazardous energy (lockout/tagout) control training program must address the following:

a. Purpose and function of the energy control program;

b. Elements of the energy control procedure relevant to employee duties; and

c. Pertinent requirements and the restrictions of the program applicable to each employee as required by the Control of hazardous energy (lockout/tagout) standard.

Interviews may be conducted as part of this evaluation to verify that employee training was provided for slide-locks and to determine the effectiveness of the lockout/tagout training program.

Furthermore, employees whose job duties require them to inspect, test or maintain slide-locks must demonstrate the following:

a. Knowledge of the employer's performance criteria for the slide-lock. The Appendix to this directive may be used to evaluate an employer's performance criteria for slide-locks;

b. Knowledge of the employer's mechanical integrity program for the slide-locks. This includes the types of testing and inspection required, the frequency of testing and inspection, and the types and frequency of maintenance required. Further guidance can be found in Section 8.1 of the Appendix; and

c. Experience, education and knowledge that qualifies the employee to inspect, test and maintain slide-lock systems. Supervisory employees should have additional qualifications that would allow them to determine that the testing, inspection, and maintenance are performed in accordance with good engineering practice.

8. Mechanical Integrity Program.

To ensure that all slide-lock components, auxiliary equipment, and safeguarding are in safe operating condition and adjustment, employers must have a mechanical integrity program based on recommendations from the manufacturer, good engineering practice, and operational experience. Section 8 of the Appendix should be consulted for inspection, testing, and maintenance criteria.

C. Citation Guidance.

1. **General.** There is no specific requirement for use of slide-locks in any standard. However, slide-lock devices are used to control hazardous mechanical energy sources and may be used as an alternative to safety blocks on mechanical power-presses. In cases where an employer does not exercise reasonable diligence in having a slide-lock device designed, constructed, and installed in accordance with good engineering practice and where the slide-lock poses a hazard, citations may be issued as follows:

The *Control of hazardous energy (lockout/tagout)* standard, §1910.147, applies to machinery servicing/maintenance activities, and the lockout/tagout standard may be cited when the employer's uses of slide-lock devices do not meet the energy control requirements of the

lockout/tagout standard. For example, 29 CFR 1910.147(c)(4)(ii)(B) may be cited if the employer does not clearly and specifically list the procedural steps for shutting down, isolating (e.g., applying the slide-lock device; locking/tagging out the electrical disconnect), and securing the machine's hazardous energy sources.

An OSHI may also cite 29 CFR 1910.147(d)(3) for failure to adequately isolate the slide on a press.

2. **Violation Classification.** Classification of violations of 29 CFR 1910.147 will be in accordance with the FCM, Chapter VI. Because violations of the lockout/tagout standard may represent conditions which could result in death or serious physical harm to employees, such violations shall normally be classified as serious. Energy control program paperwork deficiencies, on the other hand, should be addressed in accordance with MNOSHA Instruction, CPL 2.111, *Citation Policy for Paperwork and Written Program Requirement Violations.*

James Krueger, Director MNOSHA Compliance
For the MNOSHA Management Team

Distribution: OSHA Compliance and WSC Director

Attachments: Appendix A: Performance Guideline Criteria for Slide-locks

NOTICE: Minnesota OSHA Directives are used exclusively by MNOSHA personnel to assist in the administration of the OSHA program and in the proper interpretation and application of occupational safety and health statutes, regulations, and standards. They are not legally binding declarations and they are subject to revision or deletion at any time without notice.

APPENDIX A: Performance Guideline Criteria for Slide-locks

Foreword

- Automotive Industry Action Group (AIAG)
- Common Configurations
  - Pin Lock
  - Gear Lock
  - Saw Tooth Rack Lock
  - Rotating Hammer Head Lock
  - Swing Hammer Head Lock
  - Other (capable of meeting this guideline)

References

- 29 CFR 1910.147 (LOTO)
- 29 CFR 1910.212
- 29 CFR 1910.217
- ANSI B11.1 - 2001 version
- ANSI B11.2 - 1995 (R 2000) version
- ANSI B11.19 - 2003 version
- ANSI Z244.1-2003
- MIOSHA *Hydraulic Power-presses* Rule: Slide-lock Device - Section R408.12344 (as amended Feb. 18, 1997)

1) Purpose:

The intent of the criteria is to define the responsibility (supplier and user) for design, construction, installation, testing, maintenance and use of slide-locks in hydraulic, mechanical and other power-press operations when such use is required. This guideline supplements and is not intended to replace existing OSHA requirements (e.g., 29 CFR 1910.147, 1910.212, and 1910.217). Rather, it creates criteria under which slides locks can be used to provide a level of employee protection that is equal to or greater than that provided by safety blocks.

Note: A slide-lock is an energy-isolating device intended to address gravity hazards, and it is not usually intended or designed to withstand a powered stroke of the slide.

2) Scope:

Any power-press where slide-locks are used with or in lieu of safety blocks.

3) Definitions:

3.1 **Control Reliability**

3.1.1 The capability of the machine control system, the safeguarding, other control components and related interfacing to achieve a safe state in the event of a failure within their safety related functions. This performance-oriented requirement includes system component/part redundancy (two processors, two controllers, two concurrently operating relay circuits, etc,) and performance monitoring/fault detection features that assure that redundancy is maintained. Control reliability ensures that the failure of a control system or device will not result in the loss of the safety-related function(s). See also the *Safety Requirements for Mechanical Power-presses,* ANSI B11.1-2001, Section 8.7 and Annex F – *Performance of the safety related functions*.

3.2 **Maximum Anticipated Load**

3.2.1 The maximum anticipated load is normally the static weight of the slide(s), upper die(s), tooling, and all attachments that apply downward force due to gravity, but also will include reasonably foreseeable dynamic forces such as settling inertia.

3.3 **Slide-lock**

3.3.1. A slide-lock is a mechanical engaging device applied to a power-press, which shall be designed such that it will support the maximum anticipated load.

3.3.2. The slide-lock system incorporates an electrical interlocking circuit that prevents the actuation of hazardous slide motion, when engaged.

3.4 **Supplier**

3.4.1. Supplier can be the manufacturer, installer, integrator, rebuilder, modifier, or under certain cases, the user.

3.5 **Test**

3.5.1 Initial – Testing performed prior to initial use to validate the control circuitry and the capability of the slide-lock system to reliably and effectively hold the maximum anticipated load as defined in section 3.1 of this section. Testing shall be performed after any of the following circumstances:

a) Installation
b) Modification to the slide-lock system
c) Significant incident such as exposure to dynamic forces

3.5.2 **Periodic** – Testing performed as specified by the slide-lock manufacturer during the preventive/predictive maintenance process as part of the mechanical integrity program.

4) Design Criteria:

4.1 **Mechanical Performance Criteria**

4.1.1. The slide-lock device must be secured to the main structure of the press. When a press has two or more mechanical connections between the slide and crown, a gear train slide-lock option can be used.

4.1.2. The Safety Factor of the Slide-lock System shall be a minimum of 2.0 based on the maximum anticipated load. The 2.0 safety factor presumes the slide-lock system will be designed, constructed, installed, tested, maintained and used in accordance with all of the performance criteria in this document.

4.1.3. The slide-lock device shall be designed and installed as not to create an additional hazard (e.g. pinch point guarding or ergonomics considerations).

4.1.4. The supplier of the Slide-lock System on a power-press shall calculate the safety factor for the system. The supplier of the slide-lock shall rate the energy-isolating device at its rated load (maximum use) capacity so that the user can incorporate the design information into the machine's hazard analysis (risk assessment). The installer shall post this information on the press, and the user shall assure that the information remains on the press in a legible format.

4.2 **Electrical Performance Criteria**

4.2.1. When the slide-lock system is engaged, it shall be interlocked with the machine control to prevent actuation of slide motion.

The system shall be designed to enable users to personally secure the system in the engaged state (typical means of achieving this would be a lockable device).

All electrical control of components actuating and monitoring the slide-lock position shall be designed and installed using a control-reliable system. Control-reliable systems achieve a safe state in the event of a failure within their safety-related function.

4.2.2. Prior to slide-lock engagement on mechanical power-presses, per ANSI B11.1– 2001, the clutch shall be disengaged. The main motor shall be de-energized (to prevent dynamic loading) in accordance with the provisions of the 1910.147 standard (LOTO) if machine actuation and/or dynamic loading present an employee hazard.

Note: Electrical interlocks and other control circuits may not be used exclusively to control hazardous energy during servicing and maintenance operations covered by *OSHA's Control of hazardous energy (lockout/tagout) standard*, 29 CFR 1910.147. However, electrical interlocks and other control circuits, which meet the *American National Standards for Machine Tools, Performance Criteria for Safeguarding* (ANSI B11.19-2003) control reliability provisions, may be used in conjunction with slide-locks and in lieu of other energy isolation devices to provide effective alternative employee protection for servicing and maintenance activities that meet each of the elements in the lockout/tagout standard's *minor servicing exception*, 29 CFR 1910.147 (a)(2)(ii)(NOTE).

4.2.3 Prior to slide-lock engagement on hydraulic power-presses, per ANSI B11.2-1995 (R2000) electrical interlocks shall prevent hazardous motion.

4.2.3.1 Dynamic loading shall be prevented through the use of multiple parallel independent circuits or components with a combination of cross checking, self-checking, and redundancy. Energy isolation devices meeting the provisions of the 29 CFR 1910.147 standard (LOTO) also must be used to prevent hazardous motion after slide-lock engagement, if machine actuation and/or dynamic loading after slide-lock engagement would present an employee hazard.

Note: Electrical interlocks and other control circuits may not be used exclusively to control hazardous energy during servicing and maintenance operations covered by OSHA's *Control of hazardous energy (lockout/tagout) standard*, 29 CFR 1910.147. However, electrical interlocks and other control circuits, which meet *the American National Standards for Machine Tools, Performance Criteria for Safeguarding* (ANSI B11.19-2003) control reliability provisions, may be used in conjunction with slide-locks and lieu of other energy isolation devices to provide effective alternative employee protection for servicing and maintenance activities that meet each of the elements in the lockout/tagout *standard's minor servicing exception*, 29 CFR 1910.147(a)(2)(ii)(NOTE).

4.3 **General Design Modifications**

4.3.1. The user shall not modify the slide-lock system without prior consultation with the Slide-lock Manufacturer, or if no longer available, an entity capable of assuring that any modification provides a level of performance equal to or greater than the original design.

5) Visual Indication Criteria:

5.1 **Visual indication Criteria**

5.1.1. When the slide-lock engagement can be visually seen from the slide-lock operation point, an additional visual verification of the slide-lock engagement shall be provided by mechanical or electrical control-reliable means (e.g. indicator light).

5.1.2. When the slide-lock engagement can not be visually seen from a slide-lock operation point, two independent indications verifying slide-lock engagement shall be provided by mechanical and/or electrical control-reliable means (e.g. indicator light).

6) Personal Control Criteria:

6.1 **Personal Control Criteria**

6.1.1. A slide-lock is an energy-isolating device, used with or in lieu of safety blocks, that is intended to control gravity hazards. Exclusive control of other motion causing energy sources, in accordance with LOTO, can be achieved as described below.

6.1.1.1 When the LOTO standard requires isolation to render hazardous energy sources inoperative (see 4.2), each exposed employee must use a personal LOTO device in accordance with the provisions of the LOTO standard.

6.1.1.2 When the servicing activity is minor in nature, routine, repetitive, inherent to and takes place during normal production operations, an electric interlock system (see 4.2) may be used to prevent slide motion if the employee has exclusive control (e.g., use of keyed electrical switches; lockout of control switches; location and proximity of control devices) of the interlock system.

7) Installation Criteria:

7.1 **Installation criteria**

7.1.1. The slide-lock supplier shall provide instructions for the proper installation.

7.1.2. The slide-lock device shall be installed per the supplier's instructions.

7.1.3. Initial startup safety review. The user shall verify that the slide-lock system was installed per the design and installation instructions.

7.1.4 All installation and verification shall be performed by an individual(s) that has the training and/or experience necessary to perform these functions in a manner that assures the safe operation of the slide-lock system.

8) Inspection, Testing, and Maintenance:

8.1 **Inspection, testing, and maintenance**

8.1.1. The user must conduct initial testing and inspection of the slide-lock to verify and document the system meets all of the performance criteria as specified in this guideline.

8.1.2. The slide-lock manufacturer shall establish and document criteria and procedures for a mechanical integrity program (e.g. preventive maintenance, predictive maintenance), including the type and frequency of inspections and periodic testing. Some examples include:

- Visual inspections of mechanical system and components such as gears, pins, bushings, fasteners, bolts, and gauges;
- Nondestructive examination requirements for safety critical components (e.g., pins);
- Operational inspection and testing (e.g., verification of fault messages; component functional tests); and
- Electrical diagnostic checks – review manufacturer's recommendations.

8.1.3. The user shall establish, document, and implement a mechanical integrity program based upon the recommendations of the slide-lock manufacturer, good engineering practice, prior operating experience, and in accordance with applicable OSHA provisions (e.g., 29 CFR 1910.217(e)).

8.1.4. All inspection, testing, and maintenance shall be performed or supervised by an individual(s) that has the training and/or experience necessary to assure the inspection, testing, and maintenance is performed in a manner that assures safe operation of the slide-lock system.