

**OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
DEPARTMENT OF CONSUMER AND BUSINESS SERVICES**

PROGRAM DIRECTIVE

Program: Directive: A-263

Issued: January 9, 2008

Revised: _____

SUBJECT: Slide-lock use to control hazardous energy on machinery

AFFECTED STANDARDS/

DIRECTIVES: PD A69, 1910.147(b), 1910.217(d)(9)(iv)

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.

REFERENCES:

- General Industry Standards, 29 CFR Part 1910.
- American National Standards Institute; *Safety Requirements for Mechanical Power-presses*, ANSI B11.1 - 2001.
- American National Standards Institute; *Hydraulic Power-presses - Safety Requirements for Construction, Care and Use*, ANSI B11.2 - 1995 (R2000 and R 2005).
- American National Standards Institute; *Performance Criteria for Safeguarding*, ANSI B11.19 – 2003.
- American National Standards Institute; *Control of Hazardous Energy – Lockout/Tagout and Alternative Methods*, ANSI Z244.1-2003.
- Michigan Occupational Safety and Health Administration (MIOSHA); *Hydraulic Power-presses Rule: Slide-lock Device – Part 23*. Section 408.12344 (as amended Feb. 18, 1997).
- 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*.
- OR-OSHA *Field Inspection Reference Manual (FIRM)*, January 2003.

- OR-OSHA Program Directive A-216, Citation: Paperwork and Written Program Violations, July 1, 1997
- OR-OSHA Program Directive A-156, Lockout/Tagout, October 7, 2003
- OR-OSHA Program Directive A-69, Power Presses: Mechanical Power Presses, March 9, 2001

BACKGROUND:

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 1910.147(b) as a "... mechanical device that physically prevents the transmission or release of energy...". In particular, the OR-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 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. 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 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)*, §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. Compliance officers must use the guidance material contained in this directive when evaluating the adequacy of slide-lock use as energy isolating devices.

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, compliance officers 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)*, 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.

ENFORCEMENT POLICIES AND PROCEDURES

- A. Compliance Officer Safety. As a matter of policy, OR-OSHA prohibits routine exposure of Compliance Safety and Health Officers (CSHOs) to hazards associated with the release of hazardous energy. Facility work areas involved in the inspection must be evaluated by the CSHO before entering such areas to determine whether there are any potential hazardous energy exposures.

CSHOs 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 CSHO may endanger themselves at any time and appropriate precautionary measures must be taken based upon site evaluations and CSHO training. *CSHOs 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 CSHOs are close enough to expose themselves to an electrical hazard. CSHOs 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 OR-OSHA and the employer have complied with the requirements of §1910.333.

- B. Inspection Guidance. Section 1910.217(d)(9)(iv) requires the use of safety blocks during the die-setting process on 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 be considered as *de minimis* with respect to the 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, must 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 to safety blocks:

1. 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. CSHOs 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. CSHOs may, however, cite employers when an employer has not exercised reasonable diligence and the slide-lock system presents a serious safety hazard. Refer to Section C for citation policy.

Where employers delegate their responsibility, such as 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 OR-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, CSHOs generally must 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.

2. Evaluations of Compliance. Compliance with this Instruction must in no case replace compliance with any relevant OR-OSHA standard, such as 1910.147 or 1910.217. Evaluations must be conducted whenever slide-lock use is discovered during inspection activities.
3. Minor Servicing Exception. When evaluating slide-locks in accordance with lockout/tagout requirements, CSHOs 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 OR-OSHA's *Control of hazardous energy (lockout/tagout) standard*, 1910.147. Pursuant to 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*, 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 OR-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.).

4. 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 1910.147(c)(4). However, in the event that deficiencies are identified, the CSHO must document the associated hazards in accordance with established policy of the *Field Inspection Reference Manual (FIRM)*.

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 compliance officer to determine if the slide-lock program is equally as effective as safety blocks. Nonetheless, the CSHO must evaluate slide-locks in accordance with this directive, its appendix and with the specific requirements of the OR-OSHA standards.

The following screening questions provide a general framework to assist CSHOs 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 3.2.1 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?

5. 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: OR-OSHA's Mechanical power-presses standard, 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 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 1910.147(d)(4) and (f)(3) as well as Section 6 of the directive 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?
6. 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 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.

7. 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:

In terms of mechanical power-presses, slide-locks may be used for energy isolation purposes if their use provides a level of protection equal to or better than the use of safety blocks. In this case, the safe use of slide-locks on mechanical power-presses would be considered a *de minimis* violation of 1910.217(d)(9)(iv). Enforcement staff may, however, cite 1910.217(d)(9)(iv) if an employer's use of a slide-lock device on a mechanical power-press presents a hazard. In short, employers are required to comply with the requirements in paragraph (d)(9)(iv) for safety blocks unless they use slide-locks that are at least as safe as safety blocks.

Furthermore, 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, 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. A CSHO must also cite 1910.147(d)(3) for failure to adequately isolate the slide on a press.

2. Classification of Violations. Any violation that results in or may result in death or serious physical harm to employees may be classified as a serious violation. See the *Field Inspection Reference Manual* for details. Energy control program paperwork deficiencies, on the other hand, should be addressed in accordance with PD A-216 Citation: Paperwork & Written Program Violations, July 1, 1997.

**EFFECTIVE
DATE:**

Immediately

APPENDIX

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 OR-OSHA requirements (e.g. 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 must 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 must 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 must 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 must 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 must calculate the safety factor for the system. The supplier of the slide-lock must 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 must post this information on the press, and the user must 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 must be interlocked with the machine control to prevent actuation of slide motion.

The system must 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 must 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 must be disengaged. The main motor must 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 OR-OSHA's *Control of hazardous energy (lockout/tagout) standard*, 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*, 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 must prevent hazardous motion.

4.2.3.1 Dynamic loading must 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 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 OR-OSHA's *Control of hazardous energy (lockout/tagout) standard*, 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*, 1910.147(a)(2)(ii)(NOTE).

4.3 General Design Modifications

4.3.1. The user must 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 must 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 must 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 must provide instructions for the proper installation.

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

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

7.1.4 All installation and verification must 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 must 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 must 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 OR-OSHA provisions (e.g. 1910.217(e)).

8.1.4. All inspection, testing, and maintenance must 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.