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DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Part 1910

[Docket No. OSHA-2016-0013]

RIN: 1218-AD00

The Control of Hazardous Energy (Lockout/Tagout)

AGENCY: Occupational Safety and Health Administration (OSHA), DOL.

ACTION: Request for Information (RFI).

SUMMARY: The control of hazardous energy is regulated under OSHA's control of hazardous energy (Lockout/Tagout) standard. The standard's purpose is to protect workers from the dangers of hazardous energy. This RFI seeks information regarding two areas where modernizing the Lockout/Tagout standard might better promote worker safety without additional burdens to employers: control circuit type devices and robotics. OSHA's Lockout/Tagout standard currently requires that all sources of energy, including energy stored in the machine itself, be controlled during servicing and maintenance of machines and equipment using an energy-isolating device (EID). Control circuit type devices are specifically excluded from OSHA's definition of an EID and are thus not a compliant method of controlling hazardous energy during service and maintenance activities. But technological advances since the standard was issued in 1989 suggest that, at least in some circumstances, control circuit type devices may be at least as safe as EIDs. OSHA requests information, data, and comments that would assist the agency in determining under what conditions control circuit type devices could safely be used for the control of hazardous energy. OSHA may also consider changes to the

Lockout/Tagout standard that address hazardous energy control for new robotics technologies. Employers are increasingly using robots and robotic components in their workplaces. OSHA would like to know more about what hazards and benefits this presents with respect to control of hazardous energy, safeguards that can be used, increased efficiencies that result, and any other information related to ensuring employee safety in interfacing with robots. OSHA will use the information received in response to this RFI to determine what action, if any, it may take to reduce regulatory burdens while maintaining worker safety.

DATES: Submit comments on or before [INSERT DATE 90 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. All submissions must bear a postmark or provide other evidence of the submission date.

ADDRESSES: Submit comments and additional materials, identified by Docket No. OSHA-2016-0013, by any of the following methods:

Electronically: Submit comments and attachments electronically at *https://www.regulations.gov*, which is the Federal eRulemaking Portal. Follow the instructions online for making electronic submissions.

Facsimile: OSHA allows facsimile transmission of comments and additional material that are 10 pages or fewer in length (including attachments). Send these documents to the OSHA Docket Office at (202) 693-1648. OSHA does not require hard copies of these documents. Instead of transmitting facsimile copies of attachments that supplement these documents (for example, studies, journal articles), commenters must submit these attachments to the OSHA Docket Office, Technical Data Center, Room N3653, Occupational Safety and Health Administration, U.S. Department of Labor, 200

Constitution Avenue, NW, Washington, DC 20210. These attachments must identify clearly the sender's name, the date, subject, and docket number (OSHA-2016-0013) so that the Docket Office can attach them to the appropriate document.

Regular mail, express mail, hand delivery, or messenger (courier) service: Submit comments and any additional material (for example, studies or journal articles) to the OSHA Docket Office, Docket No. OSHA-2016-0013 or RIN 1218-AD00, Technical Data Center, Room N3653, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, DC 20210; telephone: (202) 693-2350. (OSHA's TTY number is (877) 889-5627). All additional materials must clearly identify your electronic submission by name, date, and docket number so that OSHA can attach them to your comments. Due to security procedures, there may be delays in receiving materials that are sent by regular mail. For more information about security procedures concerning the delivery of materials by express delivery, hand delivery, and messenger or courier service, please contact the OSHA Docket Office. The hours of operation for the OSHA Docket Office are 10:00 a.m. to 3:00 p.m., ET.

Instructions: All submissions must include the agency's name and the docket number for this RFI (OSHA-2016-0013). When submitting comments or recommendations on the issues that are raised in this RFI, commenters should explain their rationale and, if possible, provide data and information to support their comments or recommendations. Comments and other material, including any personal information, will be placed in the public docket without revision, and will be publicly available online at *https://www.regulations.gov*. Therefore, commenters should not submit statements that they do not want made available to the public or include any comments that may

contain personal information (either about themselves or others) such as Social Security Numbers, birth dates, and medical data.

Docket: To read or download submissions or other material in the docket, go to *https://www.regulations.gov* or the OSHA Docket Office at the above address. The *https://www.regulations.gov* index lists all documents in the docket. However, some information (e.g., copyrighted material) is not available to publicly read or download through the website. All submissions, including copyrighted material, are available for inspection at the OSHA Docket Office. Contact the OSHA Docket Office for assistance in locating docket submissions.

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SUPPLEMENTARY INFORMATION:

Copies of this Federal Register notice: Electronic copies are available at *https://www.regulations.gov*. This *Federal Register* notice, as well as news releases and other relevant information, is also available at OSHA's webpage at *https://www.osha.gov*.

References and Exhibits (optional): Documents referenced by OSHA in this RFI, other than OSHA standards and *Federal Register* notices, are in Docket No. OSHA-2016-0013 (Lock-out/Tag-out Update). The docket is available at *https://www.regulations.gov*, the Federal eRulemaking Portal. For additional information on submitting items to, or accessing items in, the docket, please refer to the

"ADDRESSES" section of this RFI. Most exhibits are available at *https://www.regulations.gov*; some exhibits (e.g., copyrighted material) are not available to download from that webpage. However, all materials in the dockets are available for inspection at the OSHA Docket Office.

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I. Introduction

OSHA is considering whether to initiate rulemaking to revise its control of hazardous energy standard for general industry. One aim of this RFI is to seek public comment on modernization of the control of hazardous energy standard without compromising worker safety. OSHA is requesting information from the public on its control of hazardous energy standard to help the agency determine how to best protect employees.

OSHA's control of hazardous energy (Lockout/Tagout) standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start-up of machines or equipment, or release of stored energy, could harm employees.[1] These hazards exist not only for the employees working directly with the machines or equipment, but also for the employees nearby. The Lockout/Tagout

[1] 29 CFR 1910.147(a)(1)(i).

standard was developed to address these hazards by establishing minimum performance requirements for the control of hazardous energy.[2]

The Lockout/Tagout standard currently requires that all hazardous energy from power sources and energy stored in the machine itself be controlled using energy isolating devices (EIDs) when an employee is performing servicing or maintenance of a machine or equipment.[3] OSHA's definition of EIDs excludes push buttons, selector switches, and other control circuit type devices.[4] Nevertheless, OSHA recognizes that there have been safety advancements to control circuit type devices since OSHA adopted the standard in 1989. Accordingly, OSHA is revisiting the Lockout/Tagout standard to consider whether to allow the use of control circuit type devices instead of EIDs for some tasks or under certain conditions. OSHA seeks information, data, and comments that would help the agency determine under which conditions, if any, control circuit type devices could safely be used. OSHA is also considering changes to the Lockout/Tagout standard that would reflect new industry best practices and technological advances for hazardous energy control in the robotics industry. OSHA invites information, data, and comments on these and any other issues or concerns that regulated employers, affected employees, and other interested parties may have regarding the existing Lockout/Tagout standard.

II. Background

A. Control Circuit Type Devices and Other Alternative Methods to Lockout/Tagout

[2] *Id*. 1910.147(a)(1)(i).
[3] *Id*. 1910.147(a)(2)(i); 1910.147(a)(3)(i); 1910.147(c)(i).
[4] *Id*. 1910.147(b).

The OSHA standard currently requires employers to use an EID to control hazardous energy during the servicing and maintenance of machines and equipment. Over the years, some employers have stated that they believe that control circuit type devices that use approved components, redundant systems, and control-reliable circuitry are as safe as EIDs. OSHA recognizes that recent technological advances may have resulted in safety improvements to control circuit type devices.

In April 2016, OSHA granted a permanent variance to Nucor Steel Connecticut Incorporated (NSCI), permitting the use of a control circuit type device for the control of hazardous energy under the specific conditions presented in NSCI's request for a variance.[5] NSCI, a manufacturer of steel wire rod and coiled rebar, had proposed the implementation of a complete system that would provide an alternative means of compliance to the requirements of 1910.147(d)(4)(i) and (ii) with regard to grinding rolls on a roll mill stand. The engineered system used a "trapped key" concept and monitored safety-rated power relays in combination with administrative procedures. The trapped key system was designed to replace a locked out EID and to function similarly to a lockout device, in that only the employee in possession of the key could restart the machine undergoing maintenance. The single key was controlled through administrative group lockout procedures that NSCI asserted matched the requirements of 29 CFR 1910.147.[6]

OSHA evaluated whether the device provided an equivalent level of employee personal control over machine re-energization, ability to account for exposed employees,

[5] OSHA-2014-0022-0013/FR 2016-08004.
[6] OSHA-2014-0022/FR 2015-30483.

and verification of isolation to that required by the OSHA standard.[7] OSHA reached three conclusions. First, OSHA concluded that the alternate device allowed energy control measures to remain under the personal control of the exposed employee through control of the trapped key using a group lockbox. Second, OSHA concluded that employees were able to verify de-energization. Third, OSHA concluded that authorized employees were easily identified before equipment restart.

After reviewing the alternative safety measures proposed in NSCI's application, and its responses to OSHA's follow-up questions,[8] OSHA granted the employer a variance permitting use of this device exclusively for this task. 81 FR 20680. OSHA granted the variance based on a safety evaluation of the complete system, not just its individual components. Specifically, OSHA evaluated whether the alternative system could, as a whole, be considered as protective as an energy isolating device. OSHA concluded that the proposed trapped key system was as effective as full lockout during this task in ensuring against internal and external failures that could lead to the release of hazardous energy. The agency determined that internal failures, such as welded relay contacts or errors in the safety relays, would not cause a critical failure without alerting employees. With respect to vulnerability from outside failures, such as attempts to bypass the system, OSHA determined that the system also provided equivalent protection to full lockout for these types of failures.

Although control circuit type devices may not permit easy visual confirmation of their application, in this instance, the system allowed the exposed employee to verify the

[7] 29 CFR 1910.147(c)(8); 1910.147(d)(4); 1910.147(d)(6).
[8] *https://www.regulations.gov/document?D=OSHA-2014-0022-0007, https://www.regulations.gov/document?D=OSHA-2014-0022-0009*

effectiveness of the system through attempted startup of the machine. In addition, the safety system was designed to revert to a safe mode in the event of a failure, the status of the safety system was monitored by multiple safety relays, and any faults would be signaled to operators. After completing an analysis of the company's variance request and accompanying documentation, OSHA determined the proposed system was an effective alternative to full lockout for the task identified in the request.

As a result of the evaluation of this recent variance request, OSHA has determined that there may be a basis for amending the Lockout/Tagout standard to allow the use of control circuit type devices for hazardous energy control under certain conditions. Based on preliminary research and alliance-partner feedback, OSHA believes the use of control circuit type devices is typically limited to the types of tasks that do not meet the minor servicing exception in the Lockout/Tagout standard but that also do not require either extensive disassembly of the machine or worker entrance into hazardous areas that may be difficult to escape quickly. An example of such a task is machine setup. OSHA is requesting information about how employers have been using these devices, including information about the types of circuitry and safety procedures being used and the limitations of their use, to determine under what other conditions control circuit type devices could safely be used.

As part of this RFI, OSHA is also evaluating criteria used by consensus standards to determine the safety effectiveness of control circuits. For example, the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) both have standards with detailed requirements for control circuit devices used for

protection from machine hazards.[9] The ISO and IEC standards evaluate the safety of a control system by considering its design and function. The IEC standards evaluate whether a system can achieve a certain "safety integrity level," while the ISO 13849-1 consensus standard evaluates "performance levels" for each safety function. The ISO 13849-2 consensus standard also has safety categories that describe both the performance level required for that category and the characteristics of the error-checking of a system in that category. The highest safety category requires both the highest performance level of the control system and the most extensive error checking. Additionally, to determine the level of safety of a control system, both the IEC and the ISO standards consider the reliability of the system as a whole and its components, the operating environment, and the effects of failure.

OSHA promulgated the current version of 29 CFR 1910.147 on September 1, 1989. OSHA relied heavily on a 1982 consensus standard published by the American National Standards Institute (ANSI).[10] The 1989 preamble stated that the ANSI standard was "[o]f great assistance to OSHA" and that "[t]he consensus standard was utilized by OSHA as the primary basis for development of its proposed standard." 54 FR 36645.

[9] See, e.g., ANSI / ISO 12100:2012 Safety of machinery — General principles for design — Risk assessment and risk reduction; ISO 13849-1:2015(E) Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design; ISO 13849-2:2012(E) Safety of machinery — Safety-related parts of control systems — Part 2: Validation; ISO/TR 22100-1:2015(E) Safety of machinery — Relationship with ISO 12100 — Part 1: How ISO 12100 relates to type-B and type-C standards; ISO/TR 22100-2:2013(E) Safety of machinery — Relationship with ISO 12100 — Part 2: How ISO 12100 relates to ISO 13849-1; ISO 14118:2000(E) Safety of machinery — Prevention of unexpected start-up; ISO/TR 14121-2:2012(E) Safety of machinery — Risk assessment— Part 2:Practical guidance and examples of methods; IEC 62040-1:2017-04 PRV(en-fr) FINAL DRAFT INTERNATIONAL STANDARD Uninterruptible power systems (UPS) – Part 1: Safety requirements; IEC 62061:2005-01+AMD1:2012-11+AMD2:2015-06 CSV(en-fr) CONSOLIDATED VERSION Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems; IEC 61508-1:2010 INTERNATIONAL STANDARD Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements.

[10] See ANSI Z244.1, American National Standard for Personnel Protection — Lockout/Tagout of Energy Sources — Minimum Safety Requirements.

ANSI reaffirmed the 1982 consensus standard "without any changes in content" in 1988 and again in 1992.

But by 2014, the Z244.1 committee recognized that, with the rapid advancement of technology, "[a]dvanced control systems provide new opportunities for addressing energy control where conventional lockout is not feasible, where energy is required to perform a task, where repetitive cycling of an energy-isolating device increases risk, and where energy is required to maintain equipment in a safe state, etc." As a result, ANSI revised its standard to include "distinct requirements for controlling hazardous energy through three different approaches: lockout (the primary approach), tagout and alternative methods."

In 2016, the committee released a new consensus standard, ANSI/ASSPP Z244.1 - 2016 The Control of Hazardous Energy Lockout, Tagout and Alternative Methods. The standard's Introduction states that it "provides for decision-making flexibility regarding hazardous energy control methodology. Alternative methods, when used, are based upon risk assessment and application of the classic hazard control hierarchy (clause 8.1.2). However, lockout continues to be emphasized as the primary hazardous energy control method." The ANSI standard requires that lockout or tagout "be used unless the user can demonstrate an alternative method will provide effective protection for persons. When lockout or tagout is not used, then alternative methods shall be used only after the hazards have been assessed and risks documented." Thus, before using an alternative method, the employer is required to complete a practicability/justification analysis, a risk assessment, and other applicable evaluations. An accompanying chart and table in the standard go through the risk assessment process and the hazard control hierarchy.

OSHA is seeking information, comments, and data on the effectiveness of these approaches to control system safety and any limitations or potential issues regarding their use for some tasks that currently require lockout/tagout.

B. Addressing New Robotics Technology in Relation to Lockout/Tagout

Because robots may contain hazardous energy, the Lockout/Tagout standard can apply to their servicing and maintenance. OSHA has previously focused on industrial robots, defined as "programmable multifunctional mechanical devices designed to move material, parts, tools, or specialized devices through variable programmed motions to perform a variety of tasks."[11] OSHA is now studying the evolution of the use of robots in the workplace and how this affects employee protections related to the control of hazardous energy in the context of the Lockout/Tagout standard.

The traditional robot model involves a large device that welds metal pieces or moves panels or assemblies. This type of robot has a fixed base and an arm that moves freely. It is kept separate from workers during its operating stage and stays behind a locked door or within a locked compartment as it works. During periods of maintenance or adjustment, these robots' movements are supposed to be limited or greatly slowed to reduce or eliminate the potential for worker injury.

The technological innovations of a new generation of robots, however, suggest that this may be changing. Unlike traditional robots, newer robots are more mobile and may be allowed to roam freely in a specified area, even if that area is separate from employees. Collaborative robots go a step further by working with human workers. In

[11] OSHA, *Robotics: Overview*, available at *https://www.osha.gov/SLTC/robotics/index.html*.

some cases, such robots are worn directly by the employees themselves, for example, as exoskeletons.

Due to these advances in robotics, OSHA is seeking information, comments, and data about any new risks of exposure to hazardous energy that employees may face as a result of increased interaction with robots. OSHA is seeking information, comments, and data on whether the agency should consider changes to the Lockout/Tagout standard that would address these new risks, as well as to account for any reduction in risks or other benefits to worker safety, associated with using robots.

C. Economic Impacts

In addition to the specific questions posed in Part III of this RFI, OSHA welcomes data and information on the potential economic impacts should OSHA decide to make changes to the Lockout/Tagout standard. When responding to the questions in this RFI, OSHA requests, whenever possible, that stakeholders discuss potential economic impacts in terms of:

a. Quantitative benefits (e.g., reductions in injuries, fatalities, and property damage);

b. Costs (e.g., compliance costs or decreases in productivity); and

c. Offsets to costs (e.g., increases in productivity, less need for maintenance and repairs).

OSHA also invites comment on any unintended consequences and consistencies or inconsistences with other policies or regulatory programs that might result if OSHA revises the 29 CFR 1910.147 standard.

OSHA welcomes all comments but requests that stakeholders discuss economic impacts in as specific terms as possible. For example, if a provision or policy change

would necessitate additional employee training, it is most helpful to OSHA to receive information on the following:

1. The training courses necessary;
2. The topics training would cover;
3. The types of employees who would need training and what percent (if any) of those employees currently receive the training;
4. The length and frequency of training;
5. Any retraining necessary; and
6. The training costs, whether conducted by a third-party vendor or by an in-house trainer.

For discussion of equipment-related costs, OSHA is interested in all relevant factors including:

1. The prevalence of current use of the equipment;
2. The purchase price;
3. Cost of installation and training;
4. Cost of equipment maintenance and operation and upgrades; and
5. Expected life of the equipment.

The agency also invites comment on the time and level of expertise required if OSHA were to implement potential changes this RFI discusses, even if dollar-cost estimates are not available.

III. Request for Information, Data, and Comments

OSHA is seeking information, data, and comments to help the agency determine what action, if any, it should take to modernize the control of hazardous energy standard

while maintaining or improving worker safety. OSHA also seeks information, data, and comments that will inform the agency's analysis of the technological and economic feasibility of any such action.

OSHA would like data, information, and comments on the following questions:

Control Circuit Type Devices.

1. In what work processes should OSHA consider allowing the use of control circuit type devices for hazardous energy control?

2. What are the limitations to using control circuit type devices? Do they have specific weaknesses or failure points that make them unsuitable for hazardous energy control?

3. If OSHA were to allow the use of control circuit type devices or other methods to control hazardous energy, would your firm choose to use them? Why or why not? Do you anticipate that these devices would save your firm money? For example, would these devices simplify operations or maintenance? Are there fewer steps needed to implement the controls? How frequently do you employ some form of lockout/tagout system in your facility?

4. Are there any specific conditions under which the use of control circuit type devices would not be advisable?

5. When the Lockout/Tagout standard was originally drafted, OSHA rejected the use of control circuit type devices for hazardous energy control due to concerns that the safety functions of these devices could fail as a result of component failure, program errors, magnetic field interference, electrical surges, or improper use or maintenance.

Have new technological advances to control circuit type devices resolved these concerns? How so?

6. Are there issues with physical feedback for control circuit type devices?

7. What are the safety and health issues involving maintenance, installation, and use of control circuit type devices? Have you found that alternative safety measures themselves cause any new or unexpected hazards or safety problems? Please provide any examples if you have them.

8. Do control circuit type devices address over-voltage or under-voltage conditions that may signal power-off, power-on, or false negatives on error checking?

9. How do control circuit systems detect if a component of a control circuit device breaks, bends, or otherwise goes out of specification? How do the systems signal this to the exposed employee? Could these types of failures create a hazard while the system continues to signal that conditions are safe?

10. What level of redundancy is necessary in determining whether a control circuit type device could be used instead of an EID?

11. Lockout/tagout on EIDs ensures that machines will not restart while an employee is in a hazardous area. How do control circuit type devices similarly account for employees working in areas where they are exposed to hazardous machine energy?

12. How do control circuit type devices permit an employee to maintain control over his/her own safety?

13. How do control circuit type devices permit employees to verify that energy has been controlled before beginning work in danger zones? How do the devices account for exposed employees before equipment is restarted?

14. Control circuit type devices have a number of claimed benefits compared to energy isolating devices, including workers' greater willingness to use such devices, better efficiency, less downtime, and the lack of a requirement to clear programming on computer controlled devices. Are there any other benefits to using control circuit type devices? Are there certain situations where these devices are especially advantageous? For example, where machine tasks require frequent repetitive access, is the process faster and/or less physically demanding than applying mechanical lock(s)?

15. What other methods or devices, if any, are being used with control circuit type devices to control the release of hazardous energy, especially in cases where the control circuit devices are only used to prevent machine start-up? Are there control circuit type devices that require additional methods or devices to fully control the release of hazardous energy? What improvements to safety or health does the use of these devices or methods provide?

16. What are the unit costs for installing and using control circuit type devices or other alternative methods of hazardous energy control? Are the costs of installing and using control circuit type devices or other alternative methods of controlling hazardous energy dependent on the capacity or efficiency of the devices? If so, please include details on the effects of capacity on these unit costs including the capacity of any equipment you use in your facility. Are these devices generally integrated into newly

purchased machinery, or are they purchased and installed separately? What steps need to be taken, and how long do those steps take, for these systems to be engaged in a manner that fully protects workers from the release of hazardous energy?

17. What additional actions is your firm taking to protect workers when they are servicing machinery with control circuit type devices in order to meet OSHA's Lockout/Tagout standard requirements? For example, does your firm purchase and use physical devices that you feel do not enhance worker protections but nonetheless are required by the OSHA standard? What are these items and how much do they cost? Please explain why you feel these items do not enhance worker protections.

18. The American National Standards Institute (ANSI), the International Organization for Standardization (ISO), and the International Electrotechnical Commission (IEC) all have standards that may be applicable to control circuit type devices.[12] Should OSHA consider adopting portions of any ANSI, ISO, or IEC standard that specifies requirements for control circuit devices as part of an updated OSHA standard? Are there recommendations in the consensus standards that you choose not to follow? If so, please explain why. Are there any requirements in these standards that would impose significant cost burdens if OSHA were to include those requirements in a revised Logout/Tagout standard? Are there provisions of one consensus standard when compared to the others that you perceive as having lower costs to implement and use on a day-to-day basis while providing protection to workers that is equal to or greater than that provided by the other standards? If so, please explain.

[12] These include, but are not limited to, ANSI B11.19-2010 American National Standard for Machines - Performance Criteria for Safeguarding, ISO 12100, ISO 14118, ISO 14121, IEC 62040, IEC 62061, and IEC 61508.

19. ISO categorizes "the ability of safety-related parts of control systems to perform a safety function under foreseeable conditions" into one of five levels, called performance levels.[13] These performance levels "are defined in terms of probability of dangerous failures per hour." Should OSHA consider requiring a specific performance level in determining whether a control circuit type device could be a safe alternative to an EID?

20. Can System Isolation Equipment, as discussed in the UL consensus standard UL6420 Standard for Equipment Used for System Isolation and Rated as a Single Unit,[14] provide protection equal to that obtained through lockout/tagout?

21. The ANSI/ASSE Z244.1 consensus standard encourages the use of risk assessment and hazard control hierarchy as alternative methods of hazardous energy control. Should OSHA consider incorporating these methods in any new standard with respect to the use of control circuit type devices?

22. Do you currently utilize the services of a specialized safety engineer or employment safety administrator to test for competency and/or ensure that the hazardous energy control system is operational? If so, how many hours does this individual spend on these tasks? Do you anticipate you would need to make use of these services if OSHA revised the Lockout/Tagout requirements to align with the consensus standards? Based on data from the Bureau of Labor Statistics, OSHA estimates that an occupational health

[13] See ISO 13849-1:2015 Safety of Machinery—Safety-Related Parts of Control Systems—Part 1: General Principles of Design.

[14] UL6420 "applies to isolating equipment incorporating electromechanical contactors remotely controlled and monitored to provide remote isolation status indication with a defined integrity level. This equipment is intended for use as an additional isolating means on the load side of the required supply-disconnecting device and over current protection. This standard applies to isolating equipment that is to be used in circuits of which the rated voltage does not exceed 1000 Vac or 1500 Vdc." See *https://standardscatalog.ul.com/standards/en/standard_6420*.

and safety specialist makes $33.14 an hour or $68,930 annually plus benefits.[15] If you have used the services of such specialists, how does this compare with your experience?

23. How much training do you currently provide on Lockout/Tagout requirements? How long does training on this subject take and how often do employees receive training on the subject? If OSHA were to revise the Lockout/Tagout standard to permit use of control circuit type devices in some circumstances, would newly hired workers require more training or less than under the current standard? What format do you use to provide training on the Lockout/Tagout standard at your facility (i.e., small group classroom session, self-guided computer modules, etc.)? If you have used third-party training vendors to provide similar training, what are the costs? If training is provided in-house, what sort of employee provides the training (i.e., a first-line supervisor, a safety and health specialist, etc.)?

Robotics.

24. Should OSHA consider making revisions to the Lockout/Tagout standard that address advances to robotics technology with respect to hazardous energy control? If so, what revisions should OSHA consider?

25. What are the aspects of design and build, the features, or the specifications of modern robots that are relevant to an evaluation of whether a robot has the potential to release hazardous energy while in the presence of employees? How do you use robotics?

[15] Bureau of Labor Statistics, Occupational Employment Statistics, May 2016 National Occupational Employment and Wage Estimate for SOC 29-9010 Occupational Health and Safety Specialists and Technicians, *https://www.bls.gov/oes/current/oes_nat.htm*. Accessed March 14, 2018.

Are robotics isolated from nearby employees? Near employees? Directly employed or worn by employees?

26. Are you aware of any instances where workers have been injured or killed by the release of hazardous energy when working with robotic technologies? Please provide examples if you have them.

27. Robots operate using software. What processes or tools exist to ensure that this software is safely operating (including protection from malware, tampering, and other threats) or displaying signs that a robot could malfunction and lead to a release of hazardous energy while in the presence of employees? Should OSHA consider making revisions to the Lockout/Tagout standard with respect to the safe functioning of robotics software? If so, what revisions should OSHA consider? To the extent that there are such revisions, how much would they increase the costs of or development hours for the software?

28. Are you currently using some form of lockout/tagout to control hazardous energy in robots? What steps do you take? How long do those steps take? Do you use any specially purchased equipment or materials for this process? How frequently do you take steps to control hazardous energy releases in your industrial robots? How does the process compare to the steps undertaken to comply with OSHA's Lockout/Tagout standard? How many labor hours do these additional steps require? Do these steps require any additional equipment? If so, what does this equipment cost?

29. Should OSHA consider adopting portions of the ANSI/RIA R15.06-2012 standard on Industrial Robots and Robot Systems, which outlines the safety requirements for risk

assessments of robotic system installations? Are there any requirements in the ANSI/RIA standard that would be prohibitively expensive for your company to implement? Are there any requirements that do not provide sufficient protections for workers?

30. Is there another standard, besides ANSI/RIA R15.06-2012 Industrial Robots and Robot Systems - Safety Requirements, that OSHA should consider in developing requirements for the control of hazardous energy involving robotics?

Specific Questions Regarding Economic Impacts.

31. Please describe in detail how a standard for the control of hazardous energy that incorporates the use of control circuit type devices or new robotic technology could create more jobs; eliminate outdated, unnecessary, or ineffective requirements; or produce other economic benefits. Please provide information supporting your view, including data, studies and articles.

32. The Regulatory Flexibility Act (5 U.S.C. § 601, as amended) requires OSHA to assess the impact of proposed and final rules on small entities. OSHA requests comments, information, and data on how many and what kinds of small businesses, or other small entities, in general industry employment could be affected if OSHA decides to revise provisions in 29 CFR 1910.147. Describe any such effects. Where possible, please provide detailed descriptions of the size and scope of operation for affected small entities and the likely technical, economic, and safety impacts for those entities.

33. In addition, are there any reasons that the benefits of reducing exposure to hazardous energy might be different in small firms than in larger firms? Are there any reasons why the costs for controlling hazardous energy would be higher for small

employers than they would be for larger employers? Are there provisions that would be especially costly to small employers? Please describe any specific concerns related to potential impacts on small entities that you believe warrant special attention from OSHA. Please describe alternatives that might serve to minimize those impacts while meeting the requirements of the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq.

IV. Authority and Signature:

Loren Sweatt, Acting Assistant Secretary of Labor for Occupational Safety and Health, authorized the preparation of this notice pursuant to 29 U.S.C. §§ 653, 655, and 657, Secretary's Order 1-2012 (77 FR 3912, Jan. 25, 2012), and 29 CFR part 1911.

Signed at Washington, DC, on May 7, 2019.

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Loren Sweatt,
Acting Assistant Secretary of Labor for Occupational Safety and Health.

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