

Maryland Department of Labor
Report on
Chapter 279 of the Acts of 2019 -
Solar Photovoltaic Lockout Tag
Requirement and Study
(House Bill 586)

November, 2019

The Honorable Larry Hogan
Governor
State House
100 State Circle
Annapolis, Maryland 21401

The Honorable Boyd K. Rutherford
Lieutenant Governor
State House
100 State Circle
Annapolis, Maryland 21401

The Honorable Thomas V. Mike Miller, Jr.
President
Senate of Maryland
State House, H-107
Annapolis, Maryland 21401

The Honorable Adrienne Jones
Speaker
Maryland House of Delegates
State House, H-107
Annapolis, Maryland 21401

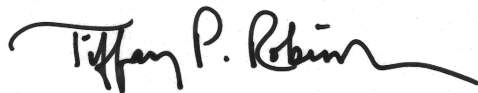
Re: Department of Labor Report on Chapter 279 of the Acts of 2019 - Solar Photovoltaic Lockout Tag Requirement and Study (House Bill 586) (MSAR# 12298).

Dear Governor Hogan, Lieutenant Governor Rutherford, President Miller, and Speaker Jones:

Chapter 279 of the Acts of 2019 (House Bill 586) requires the Department of Labor to submit a report concerning the advisability of requiring Lockout tags, as defined in §12-705 (a) of the Public Safety Article, the provision of notice of the safety benefits of lockout tags to residential customers with photovoltaic systems installed on their property, and the most effective way to implement any recommendation made under HB 586. This report includes recommendations from the Department of Labor based on this Act.

For additional information regarding the report, please contact Grason M. Wiggins, Director of Legislative and Regulatory Affairs, at grason.wiggins1@maryland.gov or (410) 230 - 6009.

Sincerely,



Tiffany Robinson
Secretary

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Introduction

Chapter 279 of the Acts of 2019 requires companies that install photovoltaic (PV) systems to install a lockout tag at each residential installation at the time of installation. The Maryland Department of Labor (Department) is tasked with creating a report concerning the advisability of requiring lockout tags, as defined in §12-705 (a) of the Public Safety Article, the provision of notice of the safety benefits of lockout tags to residential customers with photovoltaic systems installed on their property, and the most effective way to implement any recommendation made under HB 586.

The lockout tag requirement is currently enacted as an industry practice by contractors who install photovoltaic systems in Maryland. There are no federal guidelines mandating that solar photovoltaic systems be locked out with the exception of instances where maintenance is being done on energy sources or equipment by workers. Upon conducting research and engaging with stakeholders, the Department has found support for implementation of the lockout-tagout provision for future installations. However, the Department advises against a retroactive application of this standard due to its cost prohibitive nature and the redundant existing safety features built into to disconnect boxes.

Current Federal Standards

OSHA Federal guidelines mandate that energy isolating sources/ devices be secured with a lockout tag whenever maintenance is being done on energy sources or equipment.¹ The purpose of this mandate is to establish minimum performance requirements for the control of hazardous energy, which could harm employees in the event of an unexpected energization or startup of machines or equipment. Employers are required to establish a program to affix lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.² An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Federal guidelines define a lockout device as a device that uses a positive means such as a lock; either key or combination type, to hold an energy isolating device in the safe position, preventing the energizing of a machine or equipment.³

¹ See *CFR Occupational Safety and Health Standards 1910 Subpart J App A*

² See *CFR Occupational Safety and Health Standards 1910. 147(a) (3)(i)*

³ *CFR Occupational Safety and Health Standards 1910. 147(b)*

Employers must implement an energy control program, which includes a combination of energy control procedures, training, and inspections before maintenance or servicing is done. This is to ensure that employees are safe from harm due to hazardous energy sources. If an energy isolating device is capable of being locked out, the employer shall utilize lockout unless the employer can demonstrate that the use of a tagout system can offer full employee protection.⁴ If a device cannot be locked out, the employer's energy control program must use a tagout device. A tagout is defined as the placement of a device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed. When a tagout device is used on equipment which is capable of being locked out, the tagout device shall be placed in the same place where the lockout device would have been attached. The employer must demonstrate that the tagout device provides the same level of safety.

Federal guidelines establish a method for ensuring that older machines that cannot be locked out are replaced with those with lockout capabilities. Pursuant to CFR 1910. 147 (c)(2)(iii), energy isolating devices shall be designed to accept a lockout device whenever replacement, major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed after January 2, 1990. The installation of solar photovoltaic panels in residential housing is a relatively new phenomenon in Maryland, dating past the 1990 lockout capability requirements. Therefore, photovoltaic systems installed in Maryland homes should already have lockout capabilities.

Current Industry Standards

Industry standards for lockout/ tagout procedures are governed by NFPA 70E: Standard for Electrical Safety in the Workplace under article 120 which created guidelines for establishing an electrically safe work condition. Article 120 adopts the OSHA federal guidelines for an energy control program and further expounds upon them. For example, NFPA 70E distinguishes between simple and complex lockout procedures. Simple lockout procedures involve one qualified person working on a single isolated device. Complex lockout procedures may involve multiple crew members, multiple sources of energy, and take more than one work period to complete. Simple lockout/ tagout procedures are not required to be written for each application while complex lockout procedures require extensive documentation and auditing by employers for every application⁵. According to the NFPA 70E, lockout/ tagout procedures are for the purpose of safeguarding employees from exposure to electrical hazards⁶. After maintenance is

⁴ *CFR Occupational Safety and Health Standards 1910. 147 (c)(2)(ii)*

⁵ *NFPA 70 E: Standard for Electrical Safety in the Workplace 2018*. National Fire Protection Association (2017) pg. 21

⁶ *NFPA 70 E*. pg. 21

completed, the lockout of energy isolation devices such as solar panels is not currently mandated by NFPA 70E. Article 120.1 (A) mandates that employers shall supply equipment for lockout procedures and states that lockout procedures must be in place for work on: fixed permanently installed equipment, temporarily installed equipment, and portable equipment⁷. 120.1 (B) requires employers to provide the equipment necessary to; execute lockout/ tagout procedures, provide workers with training to successfully execute the procedures, and audit execution of lockout/tagout procedures⁸.

The requirements of NFPA 70E establish a system for auditing lockout procedures and ensuring that workers remain safe. An employer is required to ensure the employee performs the lockout procedure correctly. The responsibilities of the employee include: testing to ensure that an energy isolating device is not able to re-energize, taking measures to ensure that excess energy is secured, and possessing the key or ability to unlock the lockout device⁹. In order for the lockout device to be removed, the employee who is given the responsibility to install and remove the device must give their approval or remove the device themselves. The NFPA also establishes more strict requirements for the use of tagout procedures, and mandates that a lockout must be used, unless a device does not have the capability to be locked out. The NFPA states that other safety precautions must always be used when a tagout is in place.

Although the NFPA establishes stricter standards than the federal guidelines, neither the NFPA nor the federal guidelines mandate that a lockout or tagout should be permanently installed on residential homes at the time of installation. Stakeholders have confirmed that currently lockout-tagout devices are installed by an authorized user such as; public utility companies or a contractor, to ensure the safety of electrical workers. The devices are used during a project or maintenance then removed following the completion of work.

Recommendations

The Department found support for requiring lockout tags on future installations

Implementing the lockout- tagout provision requirement of House Bill 586 going forward will have minimal fiscal impact on state and local governments and has widespread support. In fact, this requirement is being considered for adoption in the next National Electrical Code revision

⁷ NFPA 70E. pg. 21

⁸ NFPA 70E. pg. 21

⁹ NFPA 70E. pg. 23

coming out in 2020. Inclusion of this requirement in the code would mandate lockout tags in every jurisdiction that adopts this code. According to data analysis done by local inspectors, implementing the lockout- tagout requirement for future solar photovoltaic installations would have minimal fiscal impact as inspectors would be instructed to check for compliance with the statute. Additionally, written testimony provided by the Office of the Prince George's County Executive for the legislative hearing of House Bill 586 agreed with this assessment and supported requiring lockout tags going forward.

The Department found prohibitive costs and hurdles for retroactive implementation

The Department of Labor consulted stakeholders, and written testimony provided at the hearing for House Bill 586, and found that requiring lock out tags on all previously installed units would be cost prohibitive for local governments and homeowners who installed the units. Additionally it would not increase the safety of the units or decrease the possibility of electrocution. Prior solar voltaic devices have been installed and inspected according to standards which were in place at the time of installation. In Harford County alone, 4,000 building and electrical permits have been issued related to solar panels. Each of these permits already have the required inspections and/ or are expired. There are an estimated 61,000 solar systems in Maryland which are installed for residential use.

If the Lockout- tagout provision, and mandate inspections are applied retroactively, local governments would not be authorized to unilaterally access and inspect solar panel installations which have already been inspected and pre-approved without permission from the homeowner. Homeowners would have to contact a licensed electrician to schedule an appointment to install a lockout tag because homeowners are not advised to touch electrical equipment. The Department spoke to electricians who that indicated installing a lockout tag would take less than 30 minutes if the unit was installed according to code, but a minimum fee ranging from \$75-\$110 would be charged. If the electrician discovers the switch box is not installed to code or is damaged, a lockout tag could not be installed and the electrician would be required to address any deficiencies to bring the unit to code. This would require additional costs.

After a licensed electrician installs a lockout tag, a local government inspector would be needed to inspect the tag, thus adding additional costs to the homeowner and county. The Department contacted local governments who indicated that costs associated with permitting and inspection is at minimum one hour for the administrative process and one hour for the inspection process. These time costs are roughly estimated at \$60 per hour. This cost does not include ancillary costs such as vehicle fuel, operational expenses, and the typical fee charged by electrical

contractors to inspect and perform work on a property. In Harford county alone, a retroactive application of the lockout tagout provision of House Bill 586 would cost at least \$240,000. Likewise, a retroactive application would cost all local jurisdictions an estimated \$3.66 million excluding the ancillary costs listed earlier. Similarly, written testimony provided by the Office of the Prince George's County Executive for the legislative hearing of House Bill 586 indicated that "it would be difficult to implement a mandate to provide lockout tags for all previously installed solar photovoltaic systems. Our Department of Permitting, Inspections, and Enforcement does not have sufficient manpower to provide this service."

Redundant safety mechanisms designed to prevent accidents

Pursuant to Section 1 of House Bill 586, mandating the provision of lockout tags retroactively would not increase consumer safety due to the redundant safety precautions currently on boxes meant to prevent accidental injury, according to experts consulted by the Department

While the Department recognizes that lockout tags on all new and existing boxes will add an additional safety barrier preventing consumers from accessing the electrical inner workings of the disconnect box, this provision addresses an issue which may not exist. With the addition of a lockout tag, a consumer would have to: circumvent the lockout tag, circumvent the heavy duty safety switch, then unlock two safety latches, open the door with a big warning label, remove the thick plexiglass barrier shield over the electrical wires, unscrew wires from their connection in the control panel, and then pull the wires from their connection to expose a sliver of uninsulated wire in order to have any exposure to live electrical currents. While all of these steps are theoretically possible, existing safety precautions make it extremely unlikely. Additionally, the Department of Labor is unaware of any cases where a consumer has been harmed due to contact with the energized machinery of solar photovoltaic panels.

Accessing a Disconnect Switch Box - A How To

In order to unlock a disconnect box, a heavy duty safety switch that is installed on all boxes must be manually moved to the off position before the access door can be opened. This safety switch prevents consumers from being harmed by cutting off power in the unit. When the switch is in the "on" position, the box is connected to sources of electrical power and locked shut. It cannot be opened in this "on" position.

Step 1: Manually move the heavy duty safety lever to the off position

Figure A is a picture of a disconnect switch box in the on position. Figure B is a side view of a disconnect box in the “on” position with a properly installed lock out and tag. Figure B also shows the door latches at the top and bottom that must be opened before accessing the inside of the unit.

Figure A

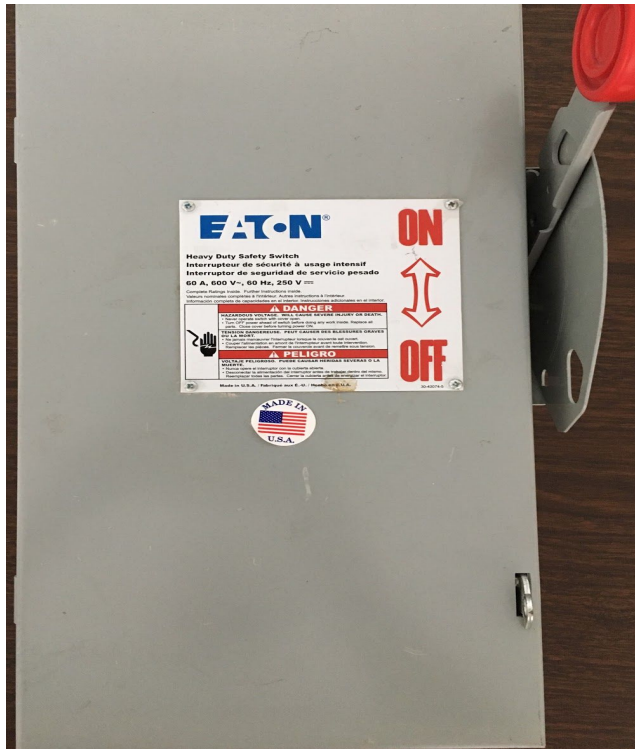


Figure B



In order to open a switch box and access the electrical wiring inside, the heavy duty safety switch must be put in the “off” position. This “off” position disconnects the panel from sources of electricity. Figure C shows the disconnect box in the off position. Figure D is a close up picture of the safety warning on the cover of the unit.



Figure C



Figure D

Step 2: Unlock the two additional safety latches

Even after switching the safety lever to the “off” position, disconnect boxes are equipped with two additional safety latches that lock the door shut. These latches, in Figures E and F, are on the sides of the unit at the top and at the bottom. These latches must be open before the door can be opened.



Figure E



Figure F

Step 3: Remove the plexiglass cover

Once the heavy duty safety switch is turned off and the side latches are unlocked, then the access door can be opened. As you can see in Figure G, even with the access door open, additional safety mechanisms are in place to prevent accidents, making it unlikely that anyone would be able to do harm to themselves through contact with active energy sources. Not only is the wiring of the solar panel insulated and difficult to access, the unit has a large plexiglass line shield that prevents the consumer from accessing the electrical components of the solar panel.



Figure G

Step 4: Unscrew wires and pull them out to expose the small section not insulated

Figure H shows that, access to any energized piece of the box is extremely difficult. With the heavy duty safety switch off and door open, the white and black wires on the bottom extending down are “off” and have no electricity. However, the black wires on the top of the unit remain energized. To accidentally injure yourself, one would have to unscrew the wires from their protective cover, and pull them out to expose the small section of wire that is not insulated.

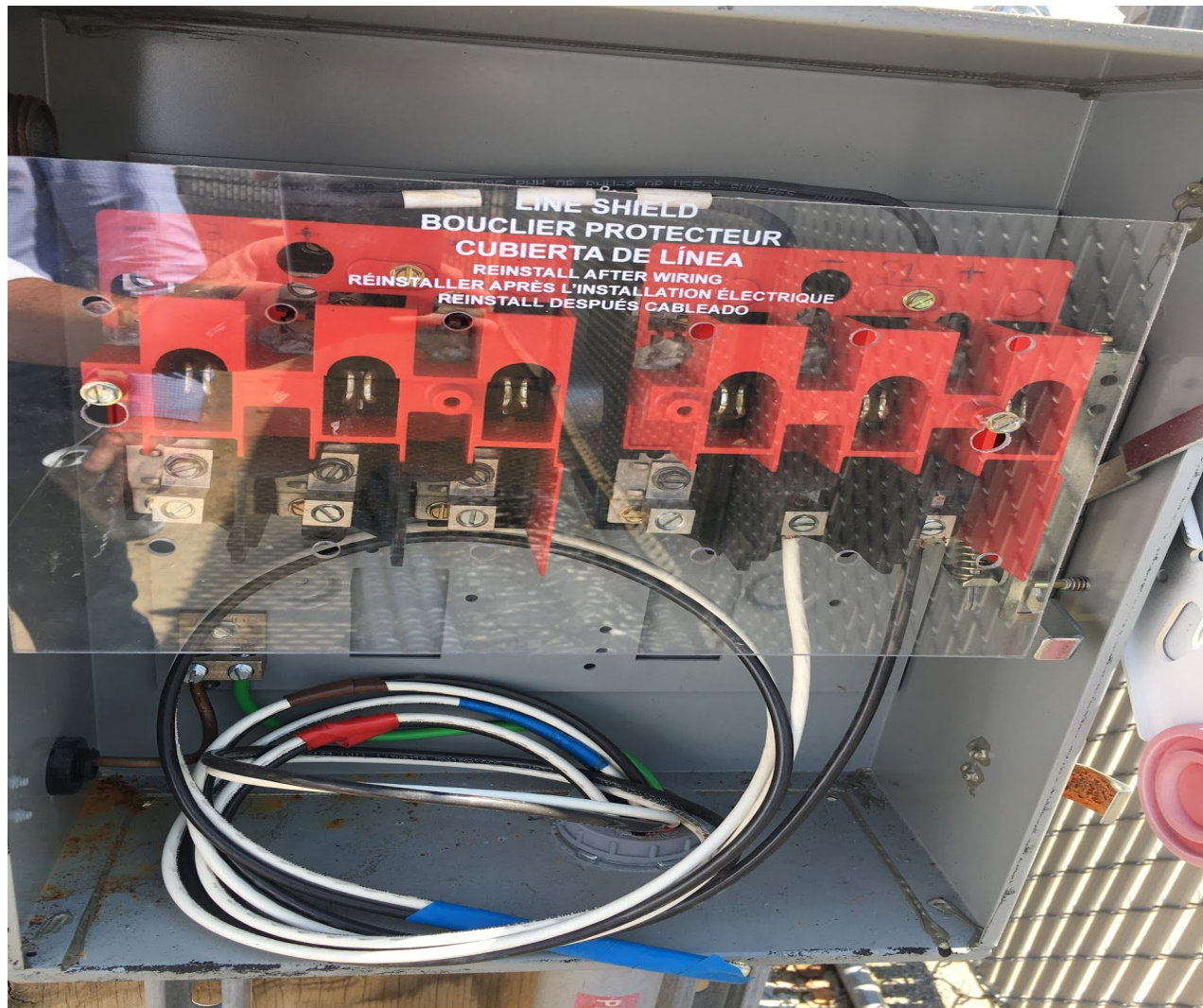


Figure H

Raising Consumer Awareness of Safety Provided by Lockout- Tagout Provision

House Bill 586 requests guidance from the Department of Labor in making Maryland residents aware of the safety benefits of a lockout- tagout device. Solar panels already possess multiple warnings on both the outside and the inside of the panel which warn residents that solar panels can potentially cause harm. Likewise, lockout- tagout devices have a warning which instructs consumers not to tamper with the device and state that only an authorized person should remove the device. The consumer is advised not to install or tamper with devices, and only skilled personnel such as licensed electricians, public utilities, solar installers, and the fire department should install and handle the devices.

The Department supports an education campaign informing the public that lockout tags should not be removed in order to prevent equipment damage and personal injury. The Department recommends a system of mailings and emails to train the general public on the importance of lockout tags and how critical it is to never override a tag. In order for the lockout tagout provision to work effectively, an identifiable red tag should be developed and installers should be trained on what information needs to be included on each tag. A combination of installer training and public education will ensure that the provision of lockout- tagout devices will enhance public safety.

Below are multiple images of a lockout- tagout device which is attached to a solar panel.



Figure I



Figure J



Figure K

Conclusion

Upon conducting research and engaging with constituent groups, the Department of Labor has found support for future implementation of the lockout- tagout provision, mandated by House Bill 586. This provision codifies industry standards which will be established in the 2020 NFPA Electrical Code and will not incur significant costs for state or local governments. The Department does not recommend a retroactive application of this provision as it is costly, redundant and will not increase consumer safety. The Department recommends cooperation with stakeholders to ensure that contractors and other authorized workers are properly educated on how to safely use tagout devices and properly mark them. Educational material can be distributed through emails or mailings in order to educate the public on the safety benefits of lockout tagout devices and the importance of not removing or tampering with such devices.

For additional information regarding the report, please contact:
Grason M. Wiggins, Director of Legislative and Regulatory Affairs,
grason.wiggins1@maryland.gov or (410) 230 - 6009.