

# Memorandum

Date: July 15, 2024

To: Autumn Gonzalez, Chief Counsel and Acting Executive Officer  
Amalia Neidhardt, Principal Safety Engineer  
Occupational Safety and Health Standards Board

From: Yancy Yap, Senior Safety Engineer  
Jason Denning, Principal Safety Engineer  
Eric Berg, Deputy Chief of Health  
Division of Occupational Safety and Health

Subject: Evaluation of Petition No. 605 to amend title 8 section 3324 regarding sliding gate fail-safe mechanisms.

## 1.0 INTRODUCTION

On May 15, 2024, the Division of Occupational Safety and Health (Cal/OSHA) received a petition from Joseph Alioto, public representative and Chairperson (Petitioner) of the Occupational Safety and Health Standards Board (Standards Board). The petitioner proposes a change to title 8 section 3324 related to horizontal sliding gates.

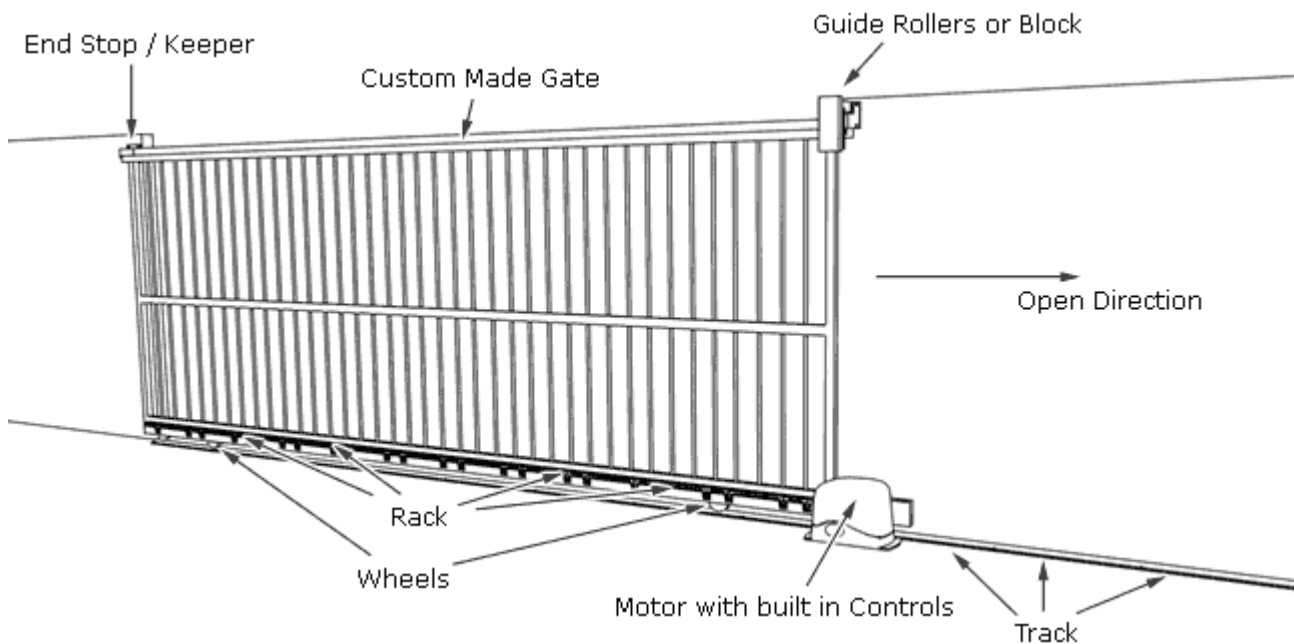
The petitioner is requesting to amend title 8 section 3324 which are regulations pertaining to safety features, performance requirements, and qualified persons as it relates to horizontal sliding gates. Additionally, the petitioner requests to review the merits of adding a new regulation to title 8 to include a safety device for swing gates.

Labor Code Section 142.2 permits interested persons to propose new or revised standards concerning occupational safety and health and requires the Occupational Safety and Health Standards Board (Standards Board) to consider such proposals. California Labor Code section 147 requires the Standards Board to refer to Cal/OSHA for evaluation of any proposed occupational safety and health standard.

## 2.0 BACKGROUND INFORMATION

The petitioner is an attorney and founder of Alioto Legal based in San Francisco who also sits as the public representative and Chairperson of the Standards Board. The hazards associated with sliding and swing gates were brought to the attention of the petitioner by two parents who lost their seven-year-old son when a sliding gate at the boy's school fell while he was attempting to close it. Based on information provided by Cal/OSHA safety engineers, the petitioner felt that current title 8 regulations do not adequately address the hazards presented to workers by sliding and swing gates.

The type of gate involved in the event described above was a horizontal sliding gate (Figure 1). Horizontal sliding gates can be manually or mechanically powered and open and close along a track equipped with stops at defined closed and open positions. Figure 1 illustrates the end-stop/positive-stop device and guide rollers that work in unison to keep the gate on its tracks and prevent it from falling.



**Figure 1. Horizontal Sliding Gate** Photo courtesy of <https://grantsautomation.com.au/index.php?page=20>.

Swing gates (Figure 2) can also be manually or mechanically powered and consist of one or more gate panels that rotate at the ends or other points along their length in a horizontal arc. These types of gates are often utilized for controlling passage of vehicles and may have physical barrier stops or as illustrated in Figure 2, may stop at a predetermined position that is programmed into a motor drive controls system.



*Figure 2. A double swing-gate. Source: <https://alphagateautomation.com.au/swing-gate-terradora/>*

### **3.0 PETITIONER'S PROPOSAL AND BASIS FOR AMENDMENT OF TITLE 8 REGULATIONS**

#### **3.1 Proposed Change to Section 3324 for Horizontal Sliding Gates**

The petitioner states that three California workers have died from failing horizontal gates from 2021-2024. These failures, the petitioner asserts, occur when the gates detach from their supporting tracks due to an imbalance in the gate's weight distribution, the lack of safety features, or failed components of the gate.

The petitioner also contends that section 3324 has not been amended since its inception in 2007 and is currently inadequate to prevent sliding gate failures that lead to serious injury and death. The petitioner did not recommend any specific regulatory language but requests to amend title 8 regulations by including the following requirements in section 3324:

1. Ensure proper functioning of stops.
2. A safety feature to prevent a derailed and separated gate from falling over more than 45 degrees from the vertical plane.
3. Guarding of gate wheels with protective covers.
4. A requirement to properly balance gates to prevent movement under its own weight.
5. Incorporate ASTM F1184-2016 (*Standard Specification for Industrial and Commercial Horizontal Slide Gates*) consensus standard by reference.
6. Incorporate ASTM F2200-20 (*Standard Specification for Automated Vehicular Gate Construction*) consensus standard by reference.
7. Incorporate UL 325-02 (*Standard for Safety: Door, Drapery, Gate, Louver, and Window Operators and Systems*) consensus standard by reference.
8. Include language stating, "all gates must be installed, operated, inspected, and maintained according to the ASTM standard and manufacturer recommendations where they exist".
9. Include language stating, "all operators must be trained following the ASTM standard and manufacturer recommendations where they exist". Section 3328 Machinery and Equipment was used as an example.

#### **3.2 Proposed New Regulation for Swing Gates**

In addition to the amendments to title 8 section 3324, the petitioner requests to adopt a new regulation concerning swing gates. Proposed regulatory language nor specific recommendations to address the hazards of swing gates were provided by the petitioner but rather requests that the reasonableness of adopting standards for swing gates set forth in ASTM F900-17 (*Standard Specification for Industrial and Commercial Steel Swing Gates*) and UL 325-02 be investigated.

### **4.0 APPLICABLE TITLE 8 REGULATIONS**

Title 8 section 3324 of the General Industry Safety Orders was enacted in 2007 after the Standards Board received a Request for a New Safety Order (Form 9) dated November 10, 2004 from Cal-OSHA<sup>1</sup>. At the time, Cal-OSHA was investigating several accidents annually involving sliding gates falling on workers. Section 3324 has not changed since its enactment in 2007 and includes the following requirements.

General Industry Safety Orders  
Group 2. Safe Practices and Personal Protection

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<sup>1</sup> Occupational Safety and Health Standards Board Rulemaking, Horizontal Sliding Gates, pg. 73-99 of 222.

## Article 7. Miscellaneous Safe Practices

### § 3324. Horizontal Sliding Gates

- (a) All horizontal sliding gates shall be equipped with positive stops or devices that limit the gate travel to the designed fully open and closed positions.
- (b) Positive stops or devices shall be constructed, installed and maintained by a qualified person to resist impact loads in order to safely contain sliding gate components within the designed stop limits.
- (c) Employees responsible for operating or inspecting horizontal sliding gates shall be instructed in the safe operation of such gates.
- (d) Repairs to gate hardware shall only be performed by a qualified person.

Title 8 section 4002 requires guarding of moving parts of machinery and equipment and has not changed since its enactment in 1982.

#### General Industry Safety Orders

#### Group 6. Power Transmission Equipment, Prime Movers, Machines and Machine Parts

#### Article 41. Prime Movers and Machinery

#### §4002. Moving Parts of Machinery or Equipment.

- (a) All machines, parts of machines, or component parts of machines which create hazardous revolving, reciprocating, running, shearing, punching, pressing, squeezing, drawing, cutting, rolling, mixing or similar action, including pinch points and shear points, not guarded by the frame of the machine(s) or by location, shall be guarded.

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## 5.0 APPLICABLE FEDERAL OSHA REGULATIONS

Federal OSHA does not have equivalent regulations to title 8 section 3324 that address safety features, performance requirements, and qualified persons as it relates to horizontal sliding gates or any other type of gates such as swing gates.

Federal OSHA has a similar regulation to title 8 section 4002 that address general guarding requirements for machinery and equipment in Title 29 CFR 1910 Subpart O. Subsection 1910.212(a)(1) requires point of operation, ingoing nip points, rotating parts of machinery and equipment to be guarded.

#### 1910 Occupational Safety and Health Standards

#### Subpart O Machinery and Machine Guarding

#### 1910.212 General requirements for all machines.

#### 1910.212(a)(1)

Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are - barrier guards, two-hand tripping devices, electronic safety devices, etc.

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## 6.0 APPLICABLE CALIFORNIA BUILDING CODE REQUIREMENTS

The California Building Code, which applies to all building and structures in California with limited exceptions, contains the following requirements for automated vehicular gates:

Title 24  
Part 2  
Chapter 31 Special Construction

§3110.2 Vehicular gates intended for automation.  
Vehicular gates intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

§3110.3 Vehicular gate openers.  
Vehicular gate openers, where provided, shall be listed in accordance with UL 325.

## 7.0 LOCAL GOVERNMENTAL REQUIREMENTS

### 7.1 Marin County

The Marin County Municipal Code contains the following requirements for gates in addition to the requirements in the California Building Code:

Ordinance No. 3787

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19.13.030 - Amendment of the California Building Code.

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§3110.4 All Other Gates. Any gate more than 48 inches (1219 mm) in width or more than 84 inches (2134 mm) in height shall meet the requirements of ASTM F1184, shall be installed per the manufacturer's recommendations, and shall be designed, constructed, and installed to meet all of the following:

1. Gate shall not fall over more than 45 degrees from a vertical plane when the gate is detached from supporting hardware.
2. Gate shall be balanced and not move under the gate's own weight or by gravity.
3. Rolling wheels shall be covered.
4. Gate shall have positive stops.

§3110.5 Exceptions. For gates more than 48 inches (1219 mm) in width or more than 84 inches (2134 mm) in height serving rural agricultural properties, as determined by the director, or her/his assign, the requirements of Section 3110.4 items 1 through 4 are recommendations only and shall not be required.

### 7.2 City of San Rafael

San Rafael Ordinances contains the following requirements for gates:

§12.350.030 - Scope.

The provisions of this chapter shall apply to all vehicular gates and any gate more than forty-eight (48) inches (one thousand two hundred nineteen (1219) mm) in width or more than eighty-four (84) inches (two thousand one hundred thirty-four (2,134) mm) in height.

§12.350.040 - General requirements.

Gates shall meet the requirements of ASTM F1184 and Section 3110 of Section 12.200.020<sup>2</sup> of this Code. Gates with operators or similar systems shall also meet the requirements of UL 325 and ASTM F2200.

§12.350.050 - Maintenance and inspection.

The property owner shall keep all gates on the property well maintained and in good working order. The property owner shall have or cause to have all gates on the property inspected by a gate inspector and obtain a written certification at least once every five (5) years. The property owner shall keep a copy of the most recent written certification for each gate and make it available to the building official upon request.

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## **8.0 APPLICABLE CONSENSUS STANDARDS**

### **8.1 ASTM F1184-23 Standard Specification for Industrial and Commercial Horizontal Sliding Gates**

The petitioner requested consensus standard ASTM F1184-23 to be referenced in title 8 section 3324. ASTM F1184-23 includes requirements for rolling, cantilever and overhead slide gates, gate posts, and accessories for industrial and commercial applications and applies only to manually operated gates<sup>3</sup>. This standard identifies three types of horizontal sliding gates: gates only supported from above, cantilevered gates where it's neither supported at the top or bottom of the gate, and an on-grade supported gate. The standard specifies gate material selection and manufacturing techniques to endure outdoor weather elements amongst other items. The relevant sections of ASTM F1184-23 as it relates to protecting workers from being crushed by falling horizontal sliding gates are section 4 and section 8.

#### **ASTM F1184-23 Section 4. General Requirements.**

- 4.1 Gates shall be designed, constructed, and installed to not fall over more than 45 degrees from the vertical plane, when a gate is detached from the supporting hardware.
- 4.2 Positive stops shall be required to limit travel to the designed fully open and fully closed positions. These stops shall be installed at either the top of the gate, or at the bottom of the gate where such stops shall horizontally or vertically project no more than is required to perform their intended function.
- 4.3 All weight bearing exposed rollers 8 ft (2.44 m), or less, above grade shall be guarded or covered.
- 4.6 Gates shall be designed, constructed, and installed such that their movement shall not be initiated by gravity and shall not result in continuous, unimpeded movement in either linear direction of its travel.

#### **ASTM F1184-23 Section 8. Gate Accessories.**

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<sup>2</sup> Section 12.200.20 referenced contains identical requirements to the Marin County Municipal Code provided in part 7.1 of this evaluation.

<sup>3</sup> ASTM F1184-23 only applies to manually operated Horizontal Sliding Gates per Ben Shirley ASTM F14 Chair.

- 8.1 All gate hardware shall be of sufficient strength and durability to support the gate and repeated open-close cycles.

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## 8.2 ASTM F2200-20 Standard Specification for Automated Vehicular Gate Construction

The petitioner requested consensus standard ASTM F2200-20 to be referenced in title 8 section 3324. ASTM F2200-20 address specifications for automated gates for vehicular traffic and include horizontal sliding gates, horizontal swing gates, vertical lift gates, vertical pivot gates, and overhead pivot gates. The relevant sections of ASTM F2200-20 as it relates to protecting workers from being crushed by falling horizontal sliding gates are as follows.

### ASTM F2200-20 Section 3 Terminology

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- 3.2 catcher, n—see receiver guide.

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- 3.7 entrapment, n—the condition of being caught or held in a position that increases the risk of injury.

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- 3.10 positive stop, n—a physical device that limits gate travel.

- 3.12 receiver guide, n—a device mounted to a post or other fixed object which provides lateral stability to a closed gate.

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- 3.14 vehicular horizontal slide gate, n—a gate that slides in a horizontal direction and is intended for use at a vehicular entrance or exit to a drive, parking lot, or the like.

- 3.15 vehicular horizontal swing gate, n—a gate that swings in a horizontal arc in a horizontal plane and is intended for use at a vehicular entrance or exit to a drive, parking lot, or the like.

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- 3.19 weight bearing exposed roller, n—an exposed roller that supports weight from the gate.

### ASTM F2200-20 Section 4 General Requirements

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- 4.2 Gates shall be designed, constructed, and installed to not fall over more than 45 degrees from the vertical plane, when a gate is detached from the supporting hardware.

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- 4.9 Gates shall be designed, constructed, and installed such that their movement shall not be initiated by gravity when an automatic operator is disconnected, in accordance with the following.

- 4.9.1 Vehicular horizontal slide gate. Shall not result in continuous, unimpeded movement in either linear direction of its travel.

- 4.9.2 Vehicular horizontal swing gate. Shall not result in continuous,



unimpeded movement in either direction along the arc of its path of travel.

#### **ASTM F2200-20 Section 5 Specific Applications**

5.2 This specification shall not apply to gates generally used for pedestrian access and to vehicular gates not to be auto-mated.

#### **ASTM F2200-20 Section 6 Vehicular Horizontal Slide Gates**

6.1.1 All weight bearing exposed rollers 8 ft (2.44 m), or less, above grade shall be guarded or covered.

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6.1.4 Positive stops shall be required to limit travel to the designed fully open and fully closed positions. These stops shall be installed at either the top of the gate, or at the bottom of the gate where such stops shall horizontally or vertically project no more than is required to perform their intended function.

#### **ASTM F2200-20 Section 7 Vehicular Horizontal Swing Gates**

7.1.1 Gates shall be designed, constructed, and installed so as not to create an entrapment area between the gate and the supporting structure or other fixed object when the gate moves toward the fully open position, subject to the provisions in 7.1.1.1 and 7.1.1.2.

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### **8.3 UL 325-02 Door, Drapery, Gate, Louver, and Window Operators and Systems**

The petitioner requested consensus standard UL 325-02 to be referenced in title 8 section 3324. UL 325-02 addresses electric mechanisms for opening and closing swing gates and horizontal sliding gates.

### **8.4 ASTM F900-17 Standard Specification for Industrial and Commercial Steel Swing Gates.**

ASTM F900-17 includes requirements for swing gates of various types. This standard provides specifications for design and construction elements such as materials of construction, durable coatings for exposure to outdoor elements, dimensions of gate construction, and other specifications for construction of swing gates. ASTM F900-17 does not have specific requirements for protecting workers from a swing gate when it fails at its support hinges. Restraints such as cables and chains designed to catch the gate from falling are not discussed in ASTM F900-17, however, section 6.1 is relevant to protecting workers from falling swing gates.

#### **ASTM F900-17 Section 6 Gate Accessories**

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6.1 All gate hardware shall be of sufficient strength and durability to support the gate and repeated open-close cycles.

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## **9.0 STANDARDS BOARD MEETING WITH THE FENCE AND GATE INDUSTRY**

On June 5, 2024, the Standards Board convened a meeting attended by representatives from Cal/OSHA, American Fence Association, City of San Rafael, and ASTM to discuss petition 605. The following information was ascertained from the meeting.



End-stop/positive-stop devices are subjected to repeated impact loads from gate closures and openings with the stops typically anchored using fasteners such as bolts or through welds. The ASTM F2200 and ASTM 1184 consensus standards do not provide guidance or specifications for selection of end-stops/positive-stops. Professional engineers are generally not involved with selection of end-stops/positive-stops. The selection of end-stops/positive-stops for sliding horizontal gates are generally at the discretion of the installer using their judgement and experience.

Horizontal sliding gates are built to varying sizes and can weigh from 500 to 3000 pounds. Like end-stops/positive-stops, neither ASTM F2200 nor ASTM 1184 provide guidance or specifications for selection of devices that prevent a horizontal gate from falling over (fall-over prevention devices). Therefore, the type of fall-over prevention device such as a metal post with a concrete foundation or a metal bracket mounted to the gate or a wall is determined by the gate installer using industry best practices. Like gate end stops, professional engineers are generally not involved with selecting fall-over prevention posts or brackets.

The gate industry uses ends-stops/positive-stops, fall-over prevention posts or brackets, and retention cables as devices to secure horizontal sliding gates and swing gates and prevent them from falling. Other than these devices, there are no other devices or technologies currently available to prevent gates from disengaging from their supports and falling.

## **10.0 CAL/OSHA ANALYSIS**

### **10.1 Accident Data and Effectiveness of Title 8 section 3324**

Cal/OSHA Research and Standards Safety Unit staff reviewed available data of incidents involving workers injured by falling gates from 1990 to 2005 and from 2014 to 2024. Data collected from 1990 to 2005 were compiled from the Standards Board rulemaking documents of title 8 section 3324. The data from 2014 to 2024 were compiled from inspections in the Cal/OSHA database resulting in citations of title 8 section 3324. Inspection data was unavailable from 2006 to 2013 due to a lack of access to the previous Cal/OSHA database. These accidents are provided in the Appendix and summarized in Table 1.

The data of serious injuries including fatalities were compiled to understand the mode of accident occurrence, worker groups affected (laborers versus gate technicians/maintenance), and what actions are necessary to prevent injuries and deaths. Based on the information gathered, the average number of serious injuries and fatal incidents per year from 1990 to 2005 was 1.94 incidents/year. From 2014 to 2024, there was a decrease to 1.78 incidents/year.

The data shows from 1990 through 2005, 15 out of 31 incidents (48%) involved failed or missing end-stops/positive-stops of gates. Comparing data from 2014 through 2024, 13 out of 16 incidents (81%) involved failed or missing end-stops/positive-stops of gates. Cal/OSHA believes the percentage of incidents from 1990 through 2005 was, in actuality, closer to the percentage from 2014 through 2024 of gate incidents involving failed or missing end-stops/positive-stops. This belief is based on inclusion of the terms “end-stops/positive-stops” in the regulatory language of section 3324. Terminology included in title 8 regulations is commonly utilized by Cal/OSHA Enforcement Unit staff as a guide for describing equipment components when authoring citation language. Therefore, the terms end-stops/positive-stops would be more likely to appear in data subsequent to the enactment of section 3324.

The relatively low decrease in serious injuries and fatalities per year of only 8.2 percent after the promulgation of section 3324 in 2007 illustrates the need to amend and improve section 3324 to better protect California workers.

**Table 1. A comparison of incidents before and after the 2007 enactment of section 3224.**

	<b>Average Incidents per year</b>	<b>Total Incidents</b>	<b>Manual gate</b>	<b>Non-Construction, Repair, and Maintenance worker</b>	<b>End-Stop failed to function or missing</b>
1990 thru 2005	1.94	31	29	27	15
2014 thru 2024	1.78	16	16	15	13

## **10.2 Elements of Petitioner Request**

### **10.2.1 Ensure Proper Functioning of End-Stops.**

Section 3324(a) and 3324(b) require end-stops/positive-stops to be installed on horizontal sliding gates and for them to resist gate impact loads under normal use. Although a decrease in accident rate was observed after section 3324 was enacted, many of the accidents continued to be attributed to failed or missing end-stops/positive-stops. Cal/OSHA agrees that the effectiveness of section 3324 could be improved and recommends multiple actions to enhance worker safety. Firstly, the design and installation of end-stops/positive stops should be approved by a professional engineer due to deadly consequences of failed end-stops/positive-stops. As an alternative to an engineered end-stop/positive-stop, a fail-safe design or a redundant system in which failure of the primary end-stop/positive-stop deploys a secondary or back-up device to prevent the gate from falling could be utilized. Secondly, end-stops/positive-stops should require an annual inspection by the gate owner with a requirement to maintain inspection records.

### **10.2.2 Safety feature to prevent a derailed and separated gate from falling over more than 45 degrees from the vertical plane.**

Fall-over prevention devices are not currently required by title 8 regulations. Such devices could be utilized on horizontal sliding and swing gates. However, many existing horizontal sliding gates equipped with fall-over prevention devices still result in serious injuries and fatalities because fall-over prevention relies on end-stops/positive-stops to function. Gates that slide past failed end-stops/positive-stops also slide past the fall-over prevention device, rendering it useless. The end-stops/positive-stops must function for the fall-over prevention device to be effective. Cal/OSHA recommends inclusion of a fall-over prevention device into title 8 with an additional requirement that a professional engineer make the selection of fall-over protection appropriate for the size of the gate.

### **10.2.3 Covered Wheels.**

Title 8 section 4002 of the General Industry Safety Orders requires guarding of hazardous parts of machines from inadvertent contact by workers. Cal-OSHA recommends new regulatory language in section 3324 referencing section 4002 for guarding hazardous nip points of wheels and other parts of gates.

### **10.2.4 Requirement to Properly Balance Gates to Prevent Movement Under Its Own Weight.**

Title 8 regulations do not currently address the hazard of gates that may move due to the force of gravity. Cal/OSHA supports the requirement for gates to be installed where forces due to gravity do not initiate sliding or swinging motion of gates.

### **10.2.5 Incorporate ASTM F1184-2016, ASTM F2200-20, and UL-325 Standards by Reference.**

The inclusion of ASTM F1184, ASTM F2200, and UL 325 by reference in their entirety is not

recommended by Cal/OSHA. Although these consensus standards have some requirements that allude to worker safety, most of the content within these standards is not directly relevant to worker safety. However, Cal/OSHA believes that the relevant elements of these consensus standards should be considered for inclusion into title 8.

#### **10.2.6 Language Requiring Installation, Operation, Inspection, and Maintenance According to the ASTM Standard and Manufacturer Recommendations.**

Cal/OSHA does not recommend the inclusion of language to install, inspect, maintain, and train operators according to ASTM standards and manufacture recommendations. Existing language in title 8 section 3328 currently includes requirements for installing, inspecting, and maintaining machinery and equipment. Training of employees for new equipment and process is also included in title 8 regulations under subsection 3203(a)(7). Including these requirements within section 3324 would, therefore, be unnecessary and duplicative. Additionally, ASTM F1184 and ASTM F2200 contain no language related to inspection and maintenance which could mislead employers to believe that it is not required for gates.

#### **10.2.7 Swing Gate Safety**

Cal/OSHA supports the inclusion of new title 8 regulation requiring restraints such as safety cables or chains welded to the gate to prevent it from falling during a failure of its support hinges. Two serious injuries were identified by Cal/OSHA resulting from swing gates that had fallen due to a lack of proper restraint, supporting the need for new regulation.

### **10.3 Additional Recommendations from Cal/OSHA**

#### **10.3.1 Inspections.**

Cal/OSHA supports adding a requirement to title 8 section 3324 for certain gate owners to perform and keep records of inspections on a recurring basis. Additionally, 3324 should require deficiencies be abated in a timely manner including immediately prohibiting use of gates without appropriate safety devices or gates in a damaged condition that could endanger persons.

#### **10.3.2 Controlling Hazardous Energy Between Contractors.**

Certain gates under construction, repair, or maintenance may involve multiple contractors performing various work on the gate. Top-heavy horizontal sliding gates have potential energy which becomes uncontrolled hazardous kinetic energy when they fall. Injuries occur when workers unknowingly push horizontal sliding gates past their supports not knowing end-stops/positive-stops were removed or not yet installed by other contractors. Cal/OSHA recommends new regulatory language in section 3324 requiring physical locks, tags, and a reference to section 3314 for controlling hazardous energy of machinery and equipment. Gates under construction, repair, and maintenance require control by being physically locked to prevent movement with an attached informational tag for communication between different contractors. Five accidents, two of which were fatal involved gates under construction, repair, or maintenance.

#### **10.3.3 Scope of Section 3324**

All the new proposed safety regulations should be limited to apply only to large gates, with potential to cause serious injury or death when they fall.

## 11.0 CONCLUSION

Cal/OSHA recommends the following for the amendments of title 8 regulations proposed in Petition file No. 605. As no specific language was proposed by the petitioner, the proposed amendments would be best addressed by convening an advisory committee of appropriate stakeholders.

1. Ensure proper functioning of end-stops. – GRANT
2. Include a safety feature to prevent a derailed and separated gate from falling over more than 45 degrees from the vertical plane. – GRANT
3. Requirement for gate wheels to be guarded with covers. – GRANT
4. Requirement to properly balance gates to prevent movement under its own weight. – GRANT
5. Incorporate the ASTM F1184-2016, ASTM F2200-20, and UL-325 standards by reference. – NOT RECOMMENDED (see 10.2.5 above)
6. Include language requiring installation, operation, inspection, and maintenance according to ASTM standards and manufacturer recommendations. – NOT RECOMMENDED (see 10.2.6 above)
7. Swing Gate Safety - GRANT

cc: Debra Lee, Cal/OSHA Chief

## APPENDIX

### ACCIDENT HISTORY

12-17-1990 Inspection 170187280. A maintenance worker was servicing an electrically operated metal gate (horizontal sliding) when the limit switch failed allowing the gate to open until the gate fell off of its supports. The gate fell on the worker and caused a fracture to the ankles.

02-17-1991 Inspection 112064043. A worker was opening an 18-foot wide by 9.5-foot-tall chain-link gate (horizontal sliding) with plywood panels. The gate wheels failed then derailed, and the gate fell on the worker causing a laceration to the arms and a fractured vertebrae. An angle iron bolted to the gate side which serves as an end-stop/positive-stop to prevent the gate derailment wheel was inoperative.

09-29-1991 Inspection 112118609. A worker was crushed between two overlapping projections of an electrically powered gate (horizontal sliding). The coroner's office listed the cause of death as massive injuries to the chest.

12-06-1991 Inspection 112155486. A worker was painting a newly constructed gate (horizontal sliding) weighing 2,000 pounds installed by a different contractor. The painter worker untied a rope, not knowing it held the gate in place, and pushed the gate off of its supports also not knowing the end-stops/positive-stops had not been installed yet. The worker suffered a laceration to the head and a dislocated hip bone.

10-26-1993 Inspection 120155999. Two gate technicians were adjusting hinge pins on a chain-link fence gate (horizontal sliding) when it fell over slowly, causing vertebrae fracture to one of the workers.

03-16-1994 Inspection 119969855. A worker was closing a gate (swing) measuring 40-feet long by 7-feet tall. The gate became unstable and fell on the worker causing an injury to his head involving swelling of the brain.

04-09-1994 Inspection 119890978. A security guard worker was found dead under an iron security gate (horizontal sliding) measuring 21.5-feet long by 9.5-feet tall weighing 500 to 1000 pounds. The gate had been rolled past its end-stops/positive-stops and derailed.

07-16-1996 Inspection 112119607. A trash collector worker was closing a heavy iron gate (horizontal sliding) when it derailed and fell on the worker causing back injuries, fractured ribs, and fractured arms.

08-22-1996 Inspection 119785509. A worker closing a top-heavy 250-pound steel gate (horizontal sliding) traveled past its guide rollers, became unstable, and fell on the worker causing a fracture injury. The steel end-stop/positive-stop was missing from the gate.

07-20-1997 Inspection 125659569. A security worker was struck by a metal rolling gate (horizontal sliding) that derailed and fell on him, causing hospitalization from fracture injuries.

09-13-1997 Inspection 11974485. A worker helping to close a 22-feet long by 7.5-feet-tall heavy tubular metal gate (horizontal sliding) derailed and tipped over falling on and killing the worker. The end-stops/positive-stops failed at its welds.

03-19-1998 Inspection 300755857. A truck driver worker closing a heavy steel gate (horizontal sliding) measuring 24-feet long by 10-feet tall traveled past its supports due to a missing L-bracket end-

stops/positive-stops and fell on the worker causing hospitalization from bodily injuries including a fractured arm.

09-21-1998 Inspection 126064393. A worker opening a 400-pound metal gate (horizontal sliding) was injured when it derailed and fell on the worker causing several body fractures and two weeks of hospitalization.

03-30-1999 Inspection 126071901. A security guard worker was closing a gate (horizontal sliding) when it traveled past the end of its tracks due to missing end-stops/positive-stops and fell on the worker causing crushing body injuries and several days of treatment in intensive care unit.

04-30-1999 Inspection 125498659. A worker was closing a heavy steel gate (horizontal sliding) with the assistance of a co-worker who was using a forklift. The gate derailed and fell on the worker on foot causing a fractured wrist and a lower back injury.

07-13-1999 Inspection 126097039. A worker was opening a double wrought iron gate (horizontal sliding) measuring 16-feet long by 7-feet tall and possibly 700 pounds when it fell on the worker causing hospitalization and lacerations.

07-03-2000 Inspection 126077882. A worker was closing a metal gate (horizontal sliding) measuring 20.75-feet long by 12.75-feet tall when it derailed due to ineffective end-stops/positive-stops. The gate fell on the worker causing a dislocated hip, fractured knee, and three days of hospitalization.

08-03-2000 Inspection 126078450. A worker was closing a metal gate (horizontal sliding) when it traveled past its track due to missing end-stops/positive-stops. The gate fell on the worker causing a fractured nasal bone, fractured rib, and hip laceration.

08-09-2001 Inspection 119953917. A security worker was closing a metal gate (horizontal sliding) measuring 25-feet wide by 10-feet tall weighing 9,000 pounds when the gate traveled past its tracks due to failed end-stops/positive-stops. The gate fell on the worker causing crushing injuries that resulted in death five days later.

11-15-2001 Inspection 126098250. A maintenance/repair worker was attempting to put a metal gate (horizontal sliding) weighing several hundred pounds back on its rails when it derailed and fell on him due to missing end-stops/positive-stops. The worker suffered broken ribs, punctured lungs, and a disfiguring laceration in the arm and was hospitalized for 6 days.

01-30-2002 Inspection 126181783. A worker was closing a gate (horizontal sliding) when it derailed and fell on the worker causing 8 days of hospitalization.

02-18-2002 Inspection 126085653. A security worker was closing a chain-link gate (horizontal sliding) measuring 25-feet long by 8-feet tall and approximately 250 pounds. The gate's defective wheels caused a derailment. The gate fell on the worker causing an injury requiring 6 days of hospitalization.

04-30-2002 Inspection 300813672. A worker was opening a steel gate (swing) measuring 10-feet long by 8-feet wide when it fell on the worker due to a broken hinge supporting the gate. The worker suffered a fractured hip.

10-17-2002 Inspection 301134284. A worker was opening a gate (horizontal sliding) weighing approximately 1,400 pounds when it traveled past its track and fell on the worker. The gate was missing

end-stops/positive-stops. The worker suffered a pelvic fracture.

11-10-2002 Inspection 300864345. A worker was closing a large iron gate (horizontal sliding) weighing approximately 700 pounds when it traveled past its end-stops/positive-stops, derailed, and fell on the worker causing several fractured ribs and 20 days of hospitalization.

04-09-2003 Inspection 120318662. Several workers were attempting to move a large metal gate (horizontal sliding) weighing 3,000-5,000 pounds to perform sandblasting when the gate rolled off of its tracks due to missing end-stops/positive-stops. The gate fell on a worker resulting in a fractured hand.

05-15-2003 Inspection 301137170. A worker was seriously injured which resulted in death 36 days later when a metal gate (horizontal sliding) fell on her.

09-18-2003 Inspection 300863776. A worker was closing a metal gate (horizontal sliding) measuring 22-feet long by 6-feet tall when it derailed and fell on her. The worker suffered a spinal cord injury requiring 12 days of hospitalization.

10-10-2003 Inspection 126135938. A security worker was injured when an electronically powered and automated gate (horizontal sliding) derailed and fell on the worker causing a fractured leg.

03-19-2004 Inspection 125884676. A worker was closing a metal gate (horizontal sliding) measuring 14.5-feet long by 8-feet tall weighing approximately 450 pounds. The gate derailed and fell on the worker causing a fatal injury.

09-03-2005 Inspection 307166280. A security worker was manually closing a gate (horizontal sliding) 16-feet long by 8-feet tall weighting 500 pounds that was under construction to be an automated gate. The gate did not have end-stops/positive-stops and traveled past its supports and fell on the worker causing a fatal injury.

05-17-2016 Inspection 1148267. A worker disabled the automated controls of a powered gate (horizontal sliding) in order close it. The gate measuring 19.5-feet long by 6.5-feet tall and weighing approximately 1,000 pounds traveled past its supports due to a lack of end-stops/positive-stops, causing serious fracture injuries.

08-08-2017 Inspection 1252971. A worker was closing a gate (horizontal sliding) measuring 25-feet long when it derailed and fell on the worker causing a fatal injury.

08-13-2017 Inspection 1259338. A worker closing a gate (horizontal sliding) measuring 13-feet long by 7.5-feet tall traveled past its supports due to a lack of end-stops/positive-stops and fell on the worker causing serious injury to the worker's back.

07-05-2018 Inspection 1332677. A worker was pulling on a gate (horizontal sliding) when it traveled past its supports due to a lack of end-stops/positive-stops. The gate fell on the worker causing a hip fracture.

12-29-2018 Inspection 1369942. A worker was closing a large gate (horizontal sliding) when it derailed. As the gate was falling, a safety stop (fall-over protection) at the top of the gate broke allowing the gate to fall on the worker causing fractured bones, internal injury, and hospitalization for several days.

05-11-2019 Inspection 1400475. A worker closing a cast iron gate (horizontal sliding) measuring 24-feet



long by 9.5-feet tall detached from its tracks due to a lack of end-stops/positive-stops. The gate fell on the worker causing a dislocated spine injury.

09-18-2019 Inspection 1435579. A worker was opening a large motion picture studio door (horizontal sliding gate) also known as an elephant door when the door fell on him causing rib fractures, thoracic spine fractures and internal bleeding. Unknown what caused the detachment of door.

12-07-2020 Inspection 1505381. Four workers were attempting to paint a gate (horizontal sliding) measuring 24-feet long by 9-feet tall and weighing 3,000 pounds when the gate traveled past its supports due to missing end-stops/positive-stops. The electronic gate was under construction and did not have the chain attached which would have stopped the gate from traveling past its supports. The gate fell on one of the four workers causing a fatal injury.

09-23-2021 Inspection 1554502. A worker was closing a gate (horizontal sliding) when the end-stops/positive-stops failed allowing the gate to travel off its track and falling over on the worker causing a fatal injury.

09-06-2022 Inspection 1621875. A worker was opening a gate (horizontal sliding) when it traveled beyond its supports due to missing end-stops/positive-stops causing a fatal injury to the worker.

06-06-2023 Inspection 1711209. A worker was closing a gate (horizontal sliding) when it derailed due to failed end-stops/positive-stops. The gate fell on the worker causing serious injury blood clots.

06-08-2023 Inspection 1681837. A worker was opening a gate (horizontal sliding) when it became detached due to missing end-stops/positive-stops. The gate fell on the worker causing serious injury fracture to the pelvis.

07-27-2023 Inspection 1693437. A worker was closing a gate (horizontal sliding) when it traveled beyond its supports due to a lack of end-stops/positive-stops. The gate fell on the worker causing serious injury to the back, shoulder, and hip area.

08-23-2023 Inspection 1693225. A worker was opening a gate (horizontal sliding) when it traveled beyond its tracks due to missing end-stops/positive-stops. The gate fell on the worker causing a fracture to both the ankle and the lumbar.

10-10-2023 Inspection 1711286. A worker was closing a metal gate (horizontal sliding) when it traveled beyond its designated position and derailed due to lack of end-stops/positive-stops. The gate fell on the worker causing fractures clavicle, ribs, femur and injury to lungs.

05-28-2024 Inspection 1751167. A worker closing a metal gate (horizontal sliding) measuring 35-feet wide by 5.5-feet tall traveled past its lateral supports due to a failed end-stop/positive-stop. The end-stop device doubled in function as the device preventing the gate from falling over. The gate fell on a worker causing a fatal injury.