



# American National Standard

for bakery equipment -  
safety requirements

Approved February 3, 2026



# American National Standard

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# Forward (This forward is not part of American National Standard Z50.1-2026)

The American National Standards Institute and Secretariat (American Society of Baking) shall not be responsible to anyone for the use of this standard, and will not incur any liability for damages resulting from the application or interpretation of this standard.

This standard is a revision of American National Standard for Bakery Equipment - Safety Requirements, ANSI Z50.1-2006 (R2016). This document was developed under the committee procedures of the American National Standards Institute to address the safety issues of machine design and operation. Current sanitation requirements published in ANSI/ASB Z50.2-2015 (R2020) are promulgated independently from this standard and should apply.

This project had its inception in 1943. At the request of the American Society of Bakery Engineers, a general conference was held in New York City. As a result of that conference, the American National Standards Institute established the Z50 committee, with the American Society of Baking as secretariat. The committee was composed of manufacturers, users, insurance companies, unions, and governmental agencies. The standard was approved on August 4, 1947. The original was replaced by a revised standard, ANSI Z50.1-1971, modified by an addendum Z50.1a-1973, which was subsequently revised as ANSI Z50.1-1977, ANSI Z50.1-1983, ANSI Z50.1-1988, ANSI Z50.1-1994, ANSI Z50.1-2000, ANSI ASB Z50.1-2006, ANSI ASB Z50.1-2011 and ANSI ASB Z50.1-2016. The standard was revised in 2026 from ANSI ASB Z50.1-2006 (R2016) to ANSI ASB Z50.1-2026 and substantive changes were made, including the addition of relevant sections representing technical advancements in the field.

This revision, sponsored by the American Society of Baking, brings the standard up to date with the latest developments in the baking industry.

All new installations of bakery machinery and equipment, individual items of new equipment, and new design, are to conform to the requirements of this standard. The American Society of Baking Z50 committee serves to express our commitment to providing a standard that addresses machine design and operation safety issues. Committee members are dedicated to continuous improvement and approval of the Z50.1 Safety Requirements.

Suggestions for improvement in this standard will be welcome. They should be sent to the American Society of Baking, 4231 W 96<sup>th</sup> Street, Indianapolis, IN, 4626 or [info@asbe.org](mailto:info@asbe.org). Website is [www.asbe.org](http://www.asbe.org).

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Safety Requirements for Bakery Equipment, Z50.1. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the Z50 Committee had the following members:

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# American National Standard for Bakery Equipment - Safety Requirements

## 1. General

### 1.1 Scope

The requirements of this standard apply to the design, construction, installation, safe operation, and maintenance of bakery machinery and equipment. For sanitation requirements refer to standard ANSI/ASB Z50.2.

### 1.2 Purpose

The purpose of this standard is to provide reasonable safety for bakery workers. It is intended as a guide to federal, state and municipal authorities in the drafting of their regulations and may be adopted by them in whole or in part. It is also intended as a standard reference for safety requirements for the use of bakery machinery and equipment manufacturers, and concerns employing such machinery and equipment.

### 1.3 Existing Installations

This standard, unless required by the authority having jurisdiction (AHJ), is not intended to be retroactive in its application to existing installations. However, when modifying existing equipment, the modification shall conform to the standard covering this equipment.

### 1.4 Interpretations

In cases where additional explanation or instruction is required, such requests should be referred to the American Society Baking at [info@asbe.org](mailto:info@asbe.org).

### 1.5 Areas of Responsibility

It shall be the responsibility of the equipment supplier and the equipment buyer to ascertain that the delivered equipment conforms to the applicable safety standard for such equipment. Upon completion of delivery, it shall be the responsibility of the equipment buyer to maintain the function of the delivered equipment such that all safety devices and controls are in the proper location and operating order at all times and that all personnel are properly instructed in the safe performance of their duties.

### 1.6 Minimum requirements

Variations or deviations from these minimum requirements may be permitted when an equivalent or greater level of safety is achieved and the deviation meets Federal and local code requirements. In the case of conflict with other standards or codes, the more stringent shall apply.

## 2. Definitions

In this standard the following definitions shall apply:

**accessible.** A term applied to something that can be easily exposed for inspection and cleaning, using simple tools such as screwdrivers and wrenches.

**readily accessible.** A term applied to something that can be easily exposed for inspection and cleaning without the use of tools.

**approved.** Acceptable to the authority having jurisdiction.

**basket or tray loader.** A machine that mechanically loads product into a tray or basket.

**brew tank.** A sanitary vessel, utilized to mix ingredients and to store brews or liquid sponges. It may or may not be equipped with a jacket or agitator, or both.

**bulk packer.** A machine for sorting, aligning, grouping, and packaging rolls or buns into a plastic pouch.

**cleaning.** The physical act, procedure or process of removing physical, chemical or biological impurities that have the potential to endanger public health or the removal of other items that may damage the equipment.

**conveyor.** A device for transporting material from place to place, such as a belt, chain or pneumatics.

**cooler.** A mechanical device for holding baked, fried, or similarly prepared products, either in a container or out of a container, while they reduce in temperature.

**cutting machine.** A machine or device that cuts sheeted dough carried on a conveyor, using a rotary or reciprocating cutter.

**danger** A combination of hazard and risk.

**hazard** An injury producer.

**risk** The likelihood of encountering a hazard.

**degasser.** A specially designed pump or mechanical device to force out a portion of the gases formed during fermentation of the dough.

**depanner.** A machine used to remove products from the container or carrier in which they were baked.

**depositor.** A machine that mechanically deposits a pre-determined volume of batter into a baking pan or onto a baking surface.

**divider.** A machine that mechanically divides the dough into pieces of predetermined volume or weight.

**dough brake.** A machine having one or more sets of horizontal rotating cylinders with adjustable clearance through which the dough passes to provide a predetermined reduction in dough thickness.

**dough trough elevator.** A machine that lifts and/or tilts a dough trough so that its contents are discharged into a hopper, chute or other designated equipment.

**ducts.** A term referring to enclosures utilized for conveying air, gas, dust, refuse, or other materials by means of forced air or vacuum.

**exhausters.** Fans or blowers used to withdraw air or other gases from a defined area or enclosure.

**fat filter.** A device through which melted fat flows to remove impurities.

**filling or injecting machine.** A machine that delivers a predetermined volume of a filling material into bakery products.

#### **flour handling equipment**

**dump bin and blender.** That part of the flour handling system where the containers of flour are emptied.

**flour elevator.** That part of the flour handling system that transports the flour vertically, by mechanical means.

**flour gate.** That part of the flour handling system that controls the delivery of flour.

**flour scale.** That part of the flour handling system in which flour is weighed.

**screw conveyor.** A mechanical device that transports flour by means of an enclosed continuous spiral screw rotating within the enclosure.

**sifter.** A mechanism utilized for the removal of foreign material from the flour.

**freezer.** An enclosure used for lowering the temperature of bakery products below 32°F (0° C).

**fryers - automatic frying machine.** A power-driven machine equipped with the necessary mechanisms to deposit or accept specific bakery products for frying. The fryer is equipped with conveyors to move the product through the length of the frying chamber. The temperature of the frying liquid is automatically controlled.

#### **grinders and related equipment**

**grinder, comminuters, food choppers and breakers.** Mechanisms utilized for the purpose of reducing a material to small fragments by means of rolls, knives, blades, impact hammers, attrition or other means.

**pulverizers.** Machines utilized for the purpose of reducing a material to powder or dust form by means of rolls, knives, blades, impact hammers, attrition, or other means, either powered or manual.

**guard.** A safety device, shield or barrier that effectively separates operating personnel from a reasonably foreseeable hazard. A guard will not interfere with operating standards of the machine.

**guarded.** Protected from accidental contact. Unprotected danger points and areas that are inaccessible to the operating personnel in the normal performance of their duties shall be considered guarded by location.

**hot.** A temperature of 160°F (71.1°C) or higher.

**icing machine.** A machine that automatically applies an edible coating onto bakery products.

**laminator.** A mechanical device utilized to provide a multilayered dough sheet. The machine includes two or more adjustable powered rollers to produce a dough sheet of the required pattern and thickness.

**loaders and unloaders.** Machines that mechanically transfer bakery products from one surface to another.

**lockout.** A procedure where all energy sources are isolated from the machine, the state of physical isolation is assured by a lockout device, and all potentially hazardous stored energy sources are relieved, disconnected, restrained and otherwise rendered safe. Part of the lockout procedure involves verification through machine activation.

**maintenance personnel.** Those persons who are repairing, setting up, modifying, or maintaining machines. A machine being maintained is not considered to be in operation.

**melting and tempering kettle.** A jacketed vessel, usually equipped with an agitator, utilized to heat or cool, or both, an enrobing or icing material.

**mixer.** A machine for incorporating the ingredient into a homogeneous mass.

**moulder.** A machine in which the dough pieces are shaped and formed prior to final proofing.

**operator.** Personnel whose duties are directed towards production. Those personnel who attend machines while product is being manufactured are machine operators.

#### **ovens**

**deck type oven.** Those ovens that have multiple baking surfaces that can bake various products at the same time using the same or different temperatures.

**direct fired.** Those ovens that burn fuel directly inside the baking chamber.

**direct recirculating.** Those ovens that have heating systems consisting of one or more heaters (located inside or outside the baking chamber), each heater being equipped with a burner. The

products of combustion are mixed with spent gases returned from the oven. Combustion gases are circulated through the heater and oven chamber by a fan. An overflow or vent removes part of the spent combustion gases to compensate for the fresh combustion gases added by the burner.

**electric.** Those ovens that are heated entirely by passing an electric current through resistance elements.

**flue type.** Those ovens that burn fuel in a furnace that is connected through flues, which carry the combustion to a stack.

**indirect multiple burner.** Those ovens that are heated by burners that are totally enclosed in such a way that unburned gases or products of combustion cannot enter the baking chamber.

**indirect recirculating.** Those ovens that are equipped with a gastight duct system, a furnace, and a circulating fan. Gases of combustion are circulated through this enclosed system and mixed with fresh combustion gases generated by the burner in the combustion chamber. A vent or overflow removes a portion of the gases to compensate for the fresh gases added by the burner. No unburned gases or products of combustion have access to the baking chamber.

**rack type oven.** Those ovens that use a rack carrier of pans to hold and bake products.

**steam tube.** Those ovens that are heated by a group of tubes that are partially filled with a liquid and sealed at both ends. A small part of each tube is exposed to the heat of a furnace and the larger part placed inside the baking chamber. Heat is transmitted by evaporating liquid in the furnace end of the tube. Steam thus formed travels to the other end of the tube, where the steam condenses and returns to the furnace by gravity.

**thermo oil type oven.** Those ovens that are heated by circulating heated oil from a heat exchanger at a remote location.

**packaging equipment** Mechanical devices of varying complexities normally consisting of frame, powering means, controls, product movement devices, folding and sealing or closing mechanisms, and various other attachments as may be required to obtain a sanitary, attractive, convenient and protective covering around a bakery product.

**bag loaders.** A machine that mechanically receives and conveys various bakery products, inserts them into bags of flexible material, and closes the bags.

**bundling and carton wrappers.** A machine that mechanically receives, indexes, and conveys single or grouped products into containers, and overwraps them in flexible wrapping materials.

**carton or case closer.** A machine that mechanically closes rigid hinged cover cartons, after the product has been manually or automatically inserted into it.

**form and fill.** A machine that mechanically weighs, counts or volumetrically measures products and inserts them into the flexible material pouches, which are formed and sealed by the same machine.

**tray and carton former.** A machine that mechanically forms magazine-fed flat die-cut blanks of rigid material into trays or hinged cover cartons.

**wrapper.** A machine that is equipped to mechanically convey and wrap bread and other bakery products in flexible wrapping material.

**pan greaser.** A machine that mechanically applies edible lubricant to the product surfaces of the baking pan.

**pan washer.** A machine that washes, rinses, and may dry bakery pans, containers and utensils.

**panner or peeling machine.** A machine that mechanically deposits the molded or shaped dough piece into baking pans, onto peel boards, or on baking surfaces.

**pattern former.** A machine used for arranging bakery products in a predetermined configuration.

**pretzel machine.** A machine that is basically a high-pressure extruder with hopper, extruding screws and compression chambers, a die which gives the desired shape, and a cutoff mechanism. It may be equipped with a "tyer" mechanism.

**product zone** All surfaces of the equipment with which product or ingredients may normally come in contact and return to the product or ingredients.

**non-product zone.** All surfaces outside the product zone.

**racks.** Carriers of pans, panned dough, and finished bakery products. They are usually constructed of metal and mounted on casters or provided with trolleys for use on monorail systems.

**removable** A term describing something that can be easily separated from a machine or equipment, using simple tools.

**readily removable.** A term describing something that can be easily separated from the equipment without the use of tools.

**rotary machine.** A machine that produces a molded product, normally consisting of a dough hopper, an engraved die, a corrugated feed roller, a knife, and extraction roll, and an extraction apron.

**rounder.** A machine that rounds dough pieces into balls.

**safety interlock.** A mechanical or electrical device to disengage drive means to the machine when machine safety covers or guards are opened.

**sanitation personnel.** Those persons who are cleaning or clearing machines, often according to fixed schedules. A machine being sanitized is not considered to be in operation.

**shall.** As used in this standard, a term denoting a mandatory requirement.

**sheeter.** A machine that forms dough into a sheet by compression through one or more sets of driven rolls.

**should.** As used in this standard, a term denoting an advisory requirement.

**slicer.** A machine that mechanically cuts baked bun or roll products to a predetermined pattern.

**slicing machine - bread.** A machine that is equipped with moving knives, product feed, and discharge conveyors to mechanically slice, index, and convey various sizes and types of bread. It is normally composed of frames, guards, and electric motor drive and control for the slicing knives, a manual or motor operated knife-honing mechanism and infeed and discharge conveyor drives from a wrapping or bagging machine for synchronized automatic product transfer.

**stacker and unstacker.** A machine that automatically tacks or unstacks baking pans, lids, or shipping containers.

**steam or pressure cleaner, or both.** A machine that utilizes steam or pressure, or both, for cleaning equipment and surfaces.

**stitcher.** A machine that applies a wire staple.

**topping machine.** A machine that mechanically deposits nuts, seeds, sugar, salt, etc., onto a bakery product.

**wafer cutting machine.** A machine that cuts a large wafer sheet into smaller sizes.

**wirecut.** A machine that extrudes dough through a die, where it is then cut off by use of a wire.

### 3. Protection of Designated Personnel

#### 3.1 Written Instructions

Written operating instructions as supplied by the equipment manufacturers shall be incorporated into training programs and made readily available to operating, maintenance and sanitation personnel. Operating instructions may be provided in written and/or electronic format. Note that the same person may perform operation, maintenance and/or sanitation tasks.

**3.1.1 Plant Personnel.** In cases where plant personnel perform multiple functions such as operation, maintenance, and sanitation tasks the following sections should be used for their safety.

#### 3.2 Maintenance Personnel

**3.2.1 Designation.** Maintenance personnel shall be restricted to properly trained, designated and instructed employees. It is the responsibility of the employer to train maintenance personnel in the safe performance of their responsibilities, including the use of required tools.

**3.2.2 Control of Hazardous Energy (Lockout).** Maintenance operations shall be performed using lockout procedures in compliance with the OSHA regulation, 29 CFR 1910.147: The Control of Hazardous Energy (Lockout/Tagout) and when

applicable, the guidelines for alternative measures in accordance with ANSI Z244.1. When this is impossible, additional measures shall be taken to ensure that the maintenance operation takes place with a reasonable level of safety for all personnel.

#### 3.3 Sanitation and Cleaning Personnel

**3.3.1 Designation.** Sanitation and cleaning personnel shall be restricted to properly trained, designated, and instructed employees. It is the responsibility of the employer to train sanitation and cleaning personnel in the safe performance of their responsibilities.

**3.3.2 Control of Hazardous Energy (Lockout/Tagout and Alternative Methods).** Service and maintenance functions such as sanitation and cleaning operations shall be performed in compliance with the OSHA regulation, 29 CFR 1910.147: The Control of Hazardous Energy (Lockout/Tagout) and when applicable, the guidelines for alternative measures in accordance with ANSI Z244.1-2016.

#### 3.4 Operators

**3.4.1 Designation.** Operators or operating personnel shall be restricted to properly trained, designated and instructed employees. It is the responsibility of the employer to train operators in the safe performance of their responsibilities.

#### 3.5 Records

**3.5.1 Documentation.** All training of personnel, accidents and equipment data must be documented.

### 4. Machine Principles of Design, Construction and Installation

#### 4.1 General

The general principles of design and construction given in Section 4 shall apply to all equipment covered in this standard, except where exemption from compliance is specifically stated in the special principles of design and construction relating to individual types of bakery equipment.

**4.1.1 Written Instructions.** All equipment must be supplied with written safe procedures for installation, operation, maintenance, sanitation, and disposal.

**4.1.2 Identification.** All machines shall carry permanent identification of the manufacturer on the machine proper. The identification shall include the manufacturer's name and machine model number. The identification should include the manufacturer's location, telephone number, and year of manufacture.

#### 4.2 Guarding for Machinery, Mechanical Parts, and Equipment

**4.2.1** Guarding methods such as barrier guards, fixed guards, adjustable guards, self-adjusting guards, interlocked guards, etc. shall be provided and used to protect the operator and other employees in the machine area from hazards created by point of operation, ingoing nip points, rotating parts, flying objects and sparks.

**4.2.2** Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible.

**4.2.3** Guards must be installed in such a way that it does not create or offer a hazard in and of itself.

**4.2.4** The area of the machine where work is actually performed is the point of operation and the point of operation must be guarded. The guard shall be so designed and constructed as to prevent the operator from having any part of their body in the point of operation or danger zone during the operating cycle or while the machinery is operational.

**4.2.5** When appropriate and required by other standards, guards shall be interlocked to prevent machinery from operating when guards are removed and to prevent exposure to moving parts while in operation.

**4.2.6** Emergency stop buttons or pull cord devices shall be clearly marked, unobstructed and within easy reach of employees.

**4.2.7** Interlocking devices, emergency stop buttons, and emergency pull cords, etc. may not be used as an energy isolating device. Lockout control systems and procedures must comply with 29 CFR 1910.147 The Control of Hazardous Energy (lockout/tagout).

**4.2.8** Insofar as possible, it is mandatory to display appropriate safety warning signs on all machinery to indicate potential hazards, such as moving parts, automatic start-up, and other risks associated with the machinery. These signs must be clearly visible and comply with OSHA 29 CFR 1910.144 Safety Color Code for Marking Physical Hazards and 1910.145 – Specifications for Accident Prevention Signs and Tags and relevant ANSI standards.

**4.2.9 Pinch and Shear Points.** All hazardous pinch, shear, or transfer points that are exposed to accidental contact shall be enclosed or guarded, as required by 29 CFR 1910 Subpart O.

**4.2.10 Sharp Corners and Edges.** All sharp corners, points, and edges that present a safety hazard shall be rounded, eliminated, or guarded.

**4.2.11 Power Transmission Devices.** Power driven gears, sprockets, chains, pulleys, drive belts, shafts, collars, couplings, and any other hazardous moving power transmission devices shall be protected in accordance with 29 CFR 1910.219 Mechanical Power Transmission Apparatus, and ANSI B11.19-2010 - Performance Requirements for Safeguarding.

**4.2.12 Safety Interlocks.** All guards or covers which enclose hazardous, moving parts and which must be opened during normal operations shall be provided with a safety interlock which prevents the machine from being operated, and removes all potential energy, when such guards or covers are open and shall be designed and installed to prevent interlocks from becoming bypassed, disengaged or removed. Disciplinary procedures should be applied in all situations in which guards and or safety interlocks are disabled, bypassed or removed. All product and non-product zone guards shall be fabricated in accordance with American National Standard for Power Transmission Apparatus, ANSI/ASME B15.1. All product zone and non-product zone guards shall be fabricated in accordance

with ANSI/ASB Z50.2 requirements. with allowable openings as defined by ANSI B11.19-2010.

**4.2.12.1** When the minor tool changes and adjustments, and other minor servicing activities exception as stated in 1910.147 Control of Hazardous Energy (Lockout/Tagout) standard (otherwise referred to as the Minor Service Exemption) is applied, strict adherence to the regulation shall be required and compliance with energy isolation requirements shall be maintained when the exemption cannot be applied.

**4.2.13 Handwheels.** Handwheels that rotate when the machine is in operation shall be completely smooth, solid disks, without any protrusions and shall not create nip points, shearing, crushing or abrading action.

**4.2.14 Projecting Shaft Ends.** All projecting rotating shaft ends shall comply with 29 CFR 1910.219 Mechanical Power Transmission Apparatus and have smooth beveled or rounded edges and shall not project a distance greater than one-half the shaft diameter unless guarded by nonrotating caps or other means.

**4.2.15 Rotating Parts.** Open keyways, protruding keyways, set screws, and other projections on exposed rotating shafts and parts shall be filled, made flush, or guarded and shall comply with 29 CFR 1910.219 Mechanical Power Transmission Apparatus.

**4.2.16 Lubrication.** Machinery that must be lubricated while in operation shall be provided with either extension piping to stationary fittings at a safe location outside of the guarded area or an automatic lubrication system, except where the machine is designed to be safely lubricated while in motion and shall comply with 29 CFR 1910.219 Mechanical Power Transmission Apparatus. Access to lubrication points should be in a safe area and below product surfaces.

**4.2.17 Hot Pipes and Surfaces.** Hot pipes shall be suitably insulated or guarded in areas that an employee could make any contact or would normally contact. Other hot surfaces that an employee could make contact shall be insulated or guarded, and a prominently displayed warning sign shall be provided.

**4.2.18 Protection from fall hazards.** Whenever an employee is exposed to a fall hazard on a walking or working surface, such as a work platform, mezzanine, or catwalk, etc. with an open or unprotected side or edge that is 4 feet (1.2 m) or more above a lower level, protection from fall hazards shall be provided by either guardrail systems, or personal fall protection systems.

**4.2.19 Guardrail systems.** Guardrail systems shall be designed and constructed in accordance with 29 CFR 1910.29 Fall Protection Systems and Falling Object Protection-Criteria and Practices and 29 CFR 1910.28 Duty to Have Fall Protection and Falling Object Protection.

**4.2.19.1 Personal fall protection systems.** When guardrail systems or other forms of fall protection are not feasible or practical, personal fall protection systems shall be required. Personal fall protection systems shall comply with 29 CFR 1910.140 Personal fall protection systems and ANSI/ASSP Z359 Minimum Requirements for a Comprehensive Managed Fall Protection Program. When the employer can demonstrate that the use of fall protection systems is not feasible on the working side of a platform used at a loading rack, loading dock, the work

may be done without a fall protection system, provided compliance with 29 CFR 1910.28 Duty to have fall protection and falling object protection.

**4.2.20 Fixed Ladders.** Fixed ladders shall be constructed in accordance with 29 CFR 1910.23 Ladders and ANSI ASC A14.3-2008 American National Standard for Ladders - Fixed - Safety Requirements.

**4.2.21 Portable Ladders.** Portable ladders shall be constructed in accordance with 29 CFR 1910.23 Ladders. Persons using portable ladders should be trained in the safe use, set up and positioning of portable ladders. Inspections to determine the safe condition of portable ladders shall be done prior to each use and should be performed on a regular frequency. Portable ladders deemed to be unsafe shall not be used and discarded.

**4.2.22 Stairways.** Stairs and stairways shall be designed, constructed and installed in accordance with 29 CFR 1910.25 Stairways.

**4.2.23 Industrial Robots and Robot Systems,** Industrial robot and robot systems should be constructed in accordance with ANSI/RIA R15.06 Industrial Robots and Robot Systems – Safety Requirements.

### 4.3 Conveyors

**4.3.1 General.** Design and installation should conform to 29 CFR 1910.263 Bakery Equipment and the American National Standard for conveyors and related equipment, ANSI/ASME B20.1.

**4.3.2 Conveyors through Floors and Walls.** Conveyors through floors and walls that are so arranged as to require two or more control stations shall have emergency stopping devices at each control station or a lock-out control system (lockout control systems must comply with 29 CFR 1910.147 The Control of Hazardous Energy (lockout/tagout) within easy reach of operating personnel. The release of the emergency stopping device shall not automatically start the system. It must be restarted by activating the master start button.

**4.3.3 Floor Openings.** Floor openings through which conveyors shall pass shall be guarded by standard rails and toeboards or curbs, as outlined in 4.2.19.

**4.3.4 Overhead Conveyors.** Overhead conveyors shall be provided with side guides or other means to prevent objects from falling where such conveyors pass over aisles or regularly occupied work areas in compliance with 29 CFR 1910.263 Bakery Equipment. Conveyors that are less than 7 ft (2.13 m) and more than 3 ft (0.91 m) from the floor shall have the underside of the bottom tier guarded to prevent injury to personnel.

**4.3.5 Pass-Through Conveyors.** Pass-through conveyor sections shall be counterbalances or provided with a means to hold them open. Powered conveyors shall be equipped with safety interlocks that stop the hinged section when the section is open. Conveyor controls are to be designed so that the conveyor will not automatically restart upon closure of this section. Ends of conveyors that become exposed on providing a pass-through area shall be guarded.

**4.3.6 Cross-Over Devices.** Elevated walkways or some means of safe access shall be provided over conveyors whenever such access is required in compliance with 29 CFR 1910.28 Duty to Have Fall Protection and Falling Object Protection.

**4.3.7 Conveyor Maintenance.** Conveyor maintenance shall be performed only under lockout procedures and in compliance with 29 CFR 1910.147 The Control of Hazardous Energy (lockout/tagout).

Conveyor lubrication shall be performed under lockout procedures, except where the conveyor is designed to be safely lubricated while in motion. Paragraph 4.2.6 shall apply.

### 4.4 Electrical Parts and Equipment

The National Fire Protection Association National Electrical Code, NFPA 70, shall apply in all instances.

**4.4.1 Electrical Heaters.** Electrical heaters, such as strip heaters, tubular heating elements, etc., should be insulated or guarded, or a prominently displayed warning sign shall be posted. Paragraph 4.2.17 shall apply.

**4.4.2 Electrical Pilot or Control Circuits.**

**4.4.2.1** No electrical pilot or control circuits shall be employed at a potential in excess of 120 volts to ground.

**4.4.2.2** Audible or visible means shall be provided to indicate that conveyors and equipment are to be started when startup conditions could create a hazard to personnel.

**4.4.2.3** On applications where injury to personnel might result if motors were to restart after power failures, provision shall be made to prevent the machines from automatically restarting upon restoration of power.

**4.4.3 Motor Disconnect Switches.** All motor disconnect switches shall be capable of being locked in the "off" position.

**4.4.4 Electrical Components.** Electrical components shall meet requirements of NEMA ICS 6: Enclosures standard to suit prevalent conditions, e.g., oil proof, waterproof, dust tight or explosion proof.

## 5. Dry Ingredient Handling Equipment

### 5.1 General Requirements

**5.1.1** Whenever a dry ingredient handling system is of such size that the beginning of its operation or sections of operation are remote from its final delivery points, all electrical motors operating each piece of apparatus comprising this system shall be provided with a means to stop delivery of material at the remote delivery points as well as at the beginning of the system. This may be by means of a manual switch for the motor, control panel in the equipment area, or a lock-type stop button at the delivery points. However, care must be exercised to prevent accidental startup and provide proper shutdown to prevent malfunctions of the entire system under these conditions.

**5.1.2** The control circuits of safety limit devices and/or switches should be so arranged that the operation of the limit devices and/or switch will de-energize the necessary motor or motors to prevent a system malfunction. Under these conditions,

the control circuitry shall not prevent a normal or desired shutdown or operation of the remaining portion of the system.

**5.1.3** Wherever dry ingredient handling systems are of large construction, suitable walkways or platforms, or both, shall be constructed around and over bins and apparatus when required by maintenance, operating or sanitary personnel. Paragraphs 4.2.19 and 4.2.20, and governmental regulations shall apply with 29 CFR 1910.28 Duty to Have Fall Protection and Falling Object Protection and 1910.29 Fall Protection Systems and Falling Object Protection- Criteria and Practices.

**5.1.4** All stationary oscillating and vibrating sifters, not otherwise enclosed, that would produce exposure or hazard to an employee shall be protected with standard guard rails or by location and, in every case, should be provided with a proper warning sign. (1910.145(c)(2) Caution signs.

**5.1.5** Where practical, consideration should be given to hinged guards or covers so that they will not have to be completely removed from the machine. Consideration should be given to ensure hinged guards and/or covers are free from sharp or pointed edges and corners. 1910.212(a)(2) General requirements for machine guards. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself.

**5.1.6** Dry ingredient handling equipment located in hazardous dust conditions shall be constructed to the applicable sections of the National Fire Protection Association NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities (latest edition).

**5.1.7** A safety device shall be provided to prevent the overfilling of the bulk ingredient storage tank or bin when receiving it from a bulk carrier.

## **5.2 Bag Chutes and Bag Lifts (Bag-Arm Elevators)**

**5.2.1** Bag chutes (gravity chutes for handling ingredient bags) shall be designed to keep at a minimum the speed of the bags. If the chute declines more than 30° from the horizontal, there shall be an upturn at the lower end of the chute to slow down the bags. 1910.263(d)(2)(i) Bakery Equipment standard

**5.2.2** Bag-arm elevators with manual takeoff shall be designed to operate at a capacity not exceeding six bags per minute. The arms on the conveyor chain shall be so spaced as to obtain the full capacity of the elevator with the lowest possible chain speed. There shall be a sensing device at the unloading end of the bag-arm elevator so installed as to automatically stop the conveyor chain if any bags fail to clear the conveyor arms. A prominently displayed sign shall be posted in the area of the elevator advising that personnel are prohibited from riding on the bag-arm conveyor. 1910.263(d)(2)(ii) Bakery Equipment standard

**5.2.2.1** A prominently displayed sign shall be posted in the area of the elevator advising that personnel are prohibited from riding on the bag-arm conveyor.

**5.2.3** The conveyor chain on bag-arm elevators shall travel in a suitable structure. All drums shall be completely guarded so that in case of a broken chain link the remainder of the chain will remain within its guides. Safety catches shall be provided on the load side of the chain to prevent chain and bags from falling in

the event of the chain breaking. 1910 Subpart O Machinery and Machine Guarding, 1910.212 General Requirements for All Machines

## **5.3 Dumpbin and Blender**

**5.3.1** Openings into which bags are manually dumped shall be protected by guard(s) that shall prevent the operator from contacting moving parts in the machine. 1910 Subpart O Machinery and Machine Guarding, 1910.212 General Requirements for All Machines

**5.3.2** Hinged dumpbin covers shall be provided with a suitable means to hold the covers in the open position so that they will not accidentally fall closed while the dumpbin is in use. 1910 Subpart O Machinery and Machine Guarding, 1910.212 General Requirements for All Machines

**5.3.3** All dumpbins and blenders shall be provided with suction-type dust hoods. The suction on these hoods shall be of sufficient capacity to minimize the escape of dust from the hoods. 1910.263(d)(3)(v) Bakery Equipment standard.

**5.3.4** All dumpbins shall be of suitable height from the floor to enable the operator to dump ingredients from bags without causing undue strain or fatigue. Where the edge of any bin is more than 24 in (610 mm) above the floor, a bag rest step shall be provided. 1910.263(d)(3)(vi) Bakery Equipment standard

**5.3.5** A control device for either controlled or emergency stopping of the dumpbin and blender shall be provided within three feet of the normal working location of the operator. 1910.263(d)(3)(vii) Bakery Equipment standard.

**5.3.6** A safety screen shall be provided in the intake nozzle over the bin or blender to prevent sacks from being drawn into the rotor of the dust-collecting fan. The safety screen shall have openings no larger than one-half square inch (1/2 in<sup>2</sup>), or one-half inch diameter (Ø1/2") to prevent operating personnel from getting fingers, hands or other body parts into the fan intake.

## **5.4 Air-Activated Conveyors**

**5.4.1** Portable railcar unloaders shall be so equipped that they can be moved with ease under the conditions in which they will be used.

**5.4.2** On multiple-position hose stations, an electrical limit switch or other suitable protective device shall be provided to energize a high-level indicator on the bin being filled. This will provide an alarm to the operator or shut down the bin filling equipment to prevent overfilling the bin.

**5.4.3** Blower packages shall be provided with a pressure relief valve to release excess air, if pressure builds up above allowable limits. A pressure switch, or other suitable means, should also be provided to shut down the blower under similar conditions.

**5.4.4** The electrical motors of the storage bin system shall be controlled by a sequential safety interlock system that permits the motors to start in the proper sequence. Also, should one motor fail, the sequential system will stop the upstream motors in sequence.

**5.4.5** On belt transmissions, static conducting belts shall be used to prevent the possibility of static electricity building up between sheaves.

**5.4.6** All sections of rigid tubing should be individually supported and remain in alignment before the couplings are attached so that the coupling will not have to take any of the supporting load. Rigid tubing should also be supported to prevent longitudinal motion at elbows. After the pneumatic system has been put into operation, the conveying lines should be observed for any movements or vibration. Additional bracing should be added wherever necessary throughout the system to make it rigid when it is operating (flexible tubing being the exception).

**5.4.7** Leaks on all pneumatic equipment shall be repaired as soon as possible to prevent dust from entering the atmosphere.

**5.4.8** Suitable filters shall be used to maintain proper release of conveying air.

**5.4.9** Only straps of the bolt takeup type shall be used.

**5.4.10** High level controls and safety interlock switches on the flexible connections on bins shall be inspected and tested regularly to ensure that they are working properly at all times. A written record of the test should be maintained.

**5.4.11** All equipment shall be grounded and bonded to prevent accumulation of static electricity. This is particularly important on the pneumatic conveying tubing where flexible or rigid plastic connections are made.

**5.4.12** No flame cutting, or welding shall be permitted unless the vicinity is completely free of dust and other combustibles. Suitable sign(s) shall be posted to this effect. 1910 Subpart Q; Welding, Cutting and Brazing; 1910.252

## **5.5 Storage Bins**

**5.5.1** Storage bins shall be provided with dust-tight covers. The covers shall be provided with gaskets and locks, latches, or other equivalent devices in order to ensure the dust-tightness of the cover in the closed position. Covers at openings where an employee may enter the bin shall also be provided with a means to lock open, so located that the employee may lock the cover in the open position whenever it is necessary to enter the bin. 1910.263(d)(6)(ii) Bakery Equipment standard

**5.5.2** Storage bins where the top is more than 10 ft (3.04 m) above the base shall be provided with a fixed ladder outside the bin to reach from the base to the top of the bin. Ladders extending above 20 feet (6.09 m) from the base shall have a safety cage around them (see 4.2.20). Local codes in some areas require that ladders above a certain height shall be interrupted with a safety platform. ANSI ASC A14.3 / ANSI / ASSE A1264.1 – Safety Requirements for Fixed Ladders and Workplace Surfaces Package shall apply.

**5.5.3** Storage bins above 15 ft (4.57 m) high should be equipped with either a safety cage, securely mounted inside the bin at the top, or a portable safety drop cage or equally effective device to facilitate the periodic cleaning of the upper sections of the bin interior. Access to these cages can be made through the opening where filter bags are mounted to the bins.

**5.5.4** An electric limit switch, level indicator, or other suitable protective device shall be provided in the top of each bin. It shall be designed to provide an alarm to the operator and then stop the bin filling system if an excessive amount of product is delivered to the bin.

**5.5.5** The access cover of bins shall be provided with a safety interlock for motors operating both the fill and the unloading system so that these motors cannot operate while the cover is open. 1910.263(d)(6)(vi) Bakery Equipment standard

**5.5.6** Where filter bags are mounted on top of storage bins, all opening greater than 15 in (381 mm) wide shall be protected with rods to reduce the effective opening to less than 15 in (381 mm).

**5.5.7** Maximum bulk bin loading capacity should be prominently marked on each bin.

**5.5.8** Personnel entering from the top of a storage bin shall be provided with a safety harness equipped with spark-resistant fittings and a lifeline attended by an employee outside the bin.

**5.5.9** Explosion-proof flashlights or portable lamps, as specified in NFPA 70 National Electrical Code, approved for Class II locations and clearly marked to indicate the maximum wattage of lamps for which they are approved, shall be provided for use in storage bins. Sparkproof tools shall also be provided.

**5.5.10** Pressure/vacuum relief valves should be provided on nonvented flour and sugar bins to protect them from implosion and explosion.

**5.5.11** All removable sections of the elevator casing shall be equipped with suitable stationary clamps for quick removal or shall be equipped with equivalent locking devices which contain no loose parts that may become detached from either the casing or the cover.

**5.5.12** Bulk flour bins in new construction or existing buildings must have proper explosion venting to meet local, state and federal codes. Electric motors, motor controllers and all other electrical components located in Class II hazardous areas shall conform to NFPA 70 National Electrical Code.

## **5.6 Screw Conveyors.**

Each dead-end screw conveyor shall be provided with an overflow safety gate which will operate an electric limit switch to shut down the conveyor before dangerous pressure of material is built up at the dead end.

## **5.7 Sifters**

**5.7.1** Enclosures on all types of sifters shall be so constructed that they are dust-tight.

**5.7.2** Receptacles for refuse tailings on all types of sifters shall be readily accessible and readily removable without personnel coming in contact with unguarded moving parts.

## **5.8 Weigh Hoppers and Scales**

**5.8.1** Where a transparent covering is provided over dials and other parts that must be observed visually, they shall be crack, chip and break resistant.

**5.8.2** Traveling or track-type flour scales shall be equipped with bar handles for moving them. The bar should be at least 1 in (25.4 mm) in diameter and well away from the trolley track wheels.

**5.8.3** All moving trolley wheels located within 7 ft (2.13 m) of floors or platforms shall be fully guarded on sides and ahead of rotating motion.

**5.8.4** The scale cutoff switch shall be enclosed and connected in such a manner as to protect the operator from contacting the switch.

**5.8.5** Where two or more hoppers are used on the same track, or where two or more discharge points on the same track are used, interlocks shall be provided so that the product cannot be discharged into the hopper without the hopper being centered below it.

## **5.9 Pulverizers**

**5.9.1** All belt drives used in connection with pulverizers shall be grounded by means of metal combs, grounding belts, or other effective means of removing static electricity.

**5.9.2** Pulverizing equipment shall be dust-tight and located in a room or area conforming to national and local codes for hazardous dust conditions and applicable NFPA standards. Electric motors, motor controllers, and switches of pulverizing equipment, located in Class II hazardous conditions should be constructed as prescribed in as NFPA 70 National Electrical Code.

**5.9.3** Magnetic separators shall be provided at the material inlet to the pulverizer to reduce fire and explosion hazards.

**5.9.4** In multiple pulverizer installations, when final pulverized product is pneumatically conveyed, each system shall be complete and independent to confine any possible fire or explosion to one system.

## **5.10 Grinders, Comminuters, Food Choppers, and Breakers**

**5.10.1** Manually fed hoppers shall be provided with guards covering the hopper opening to prevent the operator from coming in contact with knives, cutters or feed mechanisms, and use appropriate interlocks or stop bars.

**5.10.1.1** Grid guards, if used, shall have a maximum opening of 2 in (50.8 mm) when installed within 4 in (101.6 mm) to 36 in (914.4 mm) of the danger point.

**5.10.1.2** Parallel bars guards, if used, shall have a maximum distance between bars of 1 in (25.4 mm), when installed within 4 in (101.6 mm) to 36 in (914.4 mm) of the danger point.

**5.10.1.3** The aperture of guards installed more than 36 in (914.4 mm) from the danger point shall be small enough to prevent a person's body from falling into the feed hopper.

**5.10.2** Readily removable hoppers shall be equipped with a safety interlock.

## **6. Liquid Ingredient Handling**

### **6.1 Storage Tank or Room**

**6.1.1** Where liquids require heating to temperatures of 160°F (71.1°C) or higher, the related piping shall be insulated or guarded. Paragraph 4.2.17 shall apply.

**6.1.2** Exit doors of storage tank rooms shall be equipped with hardware of a type that can always be opened from the inside.

**6.1.3** When a line is plugged from hardening or crystallizing, the line shall be disconnected and cleaned. An open flame shall not be used to relieve the line.

**6.1.4** A sign shall be prominently posted instructing operators in the proper procedure to avoid contact with hot liquids or surfaces.

**6.1.5** All weighing or metering systems shall be provided with cutoff valves to prevent overflow situations.

**6.1.6** Sight glass on storage tanks shall be made of shatter resistant material. If the product or room is heated, the sight glass shall also be heat resistant.

**6.1.7** Storage tank manholes shall be guarded to prevent personnel from accidentally falling into the tank.

**6.1.8-** A mechanical safety device or instrumentation shall be provided to prevent the overfilling of the bulk storage tank or bin when receiving the material from a bulk carrier.

### **6.2 Storage Tank Maintenance**

**6.2.1** A sign shall be prominently posted stating that the tank shall be ventilated before anyone is allowed to enter. When personnel enter a storage tank, they shall be provided with a safety harness and lifeline attended by an employee outside the tank.

**6.2.2** The air pressure used for liquid movement shall not exceed 25 psi gage (pounds per square inch, gage) (0.176 kg/mm<sup>2</sup>, gage).

**6.2.3** When cleaning electric heat traced lines, pumps, or tanks, water shall not be used where it could contact electrical components.

**6.2.4** A lock or other safety device shall be provided on the tank fill lines, for use during maintenance or sanitation, to prevent accidental filling.

### **6.3 Process Tanks**

**6.3.1** Process Tanks shall be equipped with stickers or a sign warning against opening the tank or disconnecting associated hose or piping while in use.

**6.3.2** Jacketed process tanks shall be equipped with properly designed relief valves or energy cutoff devices to operate at the proper setting.

**6.3.3** Jacketed tanks shall be equipped with stickers or a prominently displayed sign warning of possible sudden pressure relief. A guard shall be provided to direct the dispersion of jackets contents away from the operating area in the event of a sudden pressure relief.

**6.3.4** Hot surfaces of tank jackets shall be insulated or guarded, or a prominently displayed sign shall be provided. Paragraph 4.2.17 and 6.1.1 shall apply.

**6.3.5** An effective means of guarding shall be provided to protect the operator of the process tank(s) and other employees from hazards created by potential exposure to powered agitators or moving parts.

**6.3.6** In addition to effective guarding, process tanks equipped with powered agitators or moving parts shall have the appropriate hazard identification signs or symbols applied in accordance with current versions of 29 CFR §1910.145 and ANSI Z535.3-2011 (R2017) warning stickers regarding the device. Such equipped tanks shall also be provided with an easily accessible emergency stop device in the immediate area of the operating personnel.

**6.3.7** Such equipped tanks shall be equipped with a stop switch an identifiable electrical disconnect that can be locked out in accordance with 29 CFR §1910.147 during repair service and maintenance. In addition, such equipped tanks shall have secondary safety devices in place to prevent powered agitators or moving parts the device from moving when the access hatch or lid to the tank is open and creating exposure to moving parts.

## 7. Mixers

### 7.1 Horizontal Mixers

**7.1.1** All horizontal mixers with power and manual dumping arrangement shall be equipped with safety devices that shall:

(1) Engage both hands of the operator while the bowl is opened more than 6 in (152.4 mm) when keeping the agitator in motion under power.

(2) Permit the operator to have a full view of the bowl opening while he is in the act of maintaining operation of the agitator at any time while the bowl is open more than 6 in (152.4 mm).

**7.1.2** Horizontal mixers with power dumping devices shall be so arranged so that the bowl opening cannot be closed beyond the final 6 in (152.4 mm) unless the operator maintains with both hands the control contact which caused the dump motor to complete the bowl closure.

**7.1.3** Horizontal mixers shall be provided with flourgate operating mechanisms, ingredient openings, and water inlets, which can be conveniently manipulated by the operator from the normal area of activity (either platform or floor) without requiring abnormal reaching or improvisation that might jeopardize their safety.

**7.1.4** If a horizontal mixer is equipped with an ingredient door, the total opening shall not be more than 1-1/2 ft<sup>2</sup> (0.14 m<sup>2</sup>) in area. The opening shall be provided with a grid or parallel bars to protect the employee from bodily injury.

**7.1.5** Access doors and covers, when used, shall be hinged or held captive. All access doors which expose harm have proper safety interlocks to prevent harm.

**7.1.6** Overhead covers or doors, when used, which are subject to accidental closure, shall be counterbalanced to remain in an open position or provided with means to hold them open until positively released by the operator.

**7.1.7** Provision shall be made to bolt mixers solidly to the floor to prevent dislocation or excessive vibration. Fixed platforms shall have a minimum clearance of 2 in (50.8 mm) from the mixer.

**7.1.8** Mixers shall be installed only on substantial foundations that are capable of withstanding the live loads incurred in full-capacity mixing operations.

**7.1.9** Any device or mechanism used to return sponges to a mixer shall be so interlocked with the mixer as to prevent injury to the operator.

**7.1.10** Positive means shall be provided to prevent application of pressure above the stipulated maximum pressure in all mixer cooling jackets.

**7.1.11** Valves and controls to regulate the coolant in mixer jackets shall be located as to permit access by the operator without jeopardizing his or her safety.

**7.1.12** All associated Lock Out Tag Out points, including pneumatics/hydraulics/electrical, have proper disconnects.

### 7.2 Vertical Batch Mixers

**7.2.1** 7.1.1 thru 7.1.3 and 7.1.5 thru 7.1.12 of this standard shall apply.

**7.2.2** Bowl and adaptor ring devices shall be of a positive type that requires the attention of the operator for unlocking.

**7.2.3** Devices or dollies and trucks shall be made available for bowls weighing more than 80 lb (36.82 kg), to avoid the necessity of the operator lifting the bowl or other equipment into and out of the mixing position on the machine.

**7.2.4** Precautions in the normal operation of staged mixing shall be exercised in providing protection of the operator against injury by the moving agitators.

### 7.3 Spindle Mixers (Trough Mixers)

**7.3.1** Paragraphs 7.1.5, 7.1.6, and 7.1.8 of this standard shall apply.

**7.3.2** The spindle mixer shall be provided with a permanent cover that raises and lowers with the spindle heads and will shut off the power to the spindles if the cover is raised while they are still turning. Inspection doors are prohibited in the cover.

**7.3.3** A safety interlock shall be provided so that the spindles cannot be started until the cover is in place on the trough. However, two separate jog buttons that must both be pressed simultaneously requiring two hands may be provided to jog the blades for cleaning while in the raised position.

**7.3.4** A lockable power and compressed air disconnect switch must be located on the machine to prevent spindle activation during cleaning or servicing.

**7.3.5** Entire machine and electrical controls shall be designed for wash-down service.

### 7.4 Continuous Mixers

**7.4.1** Paragraphs 7.1.8, 7.1.10, and 7.1.11 of this standard shall apply.

**7.4.2** Mixer removable covers shall be hinged or otherwise held in proximity to the openings that they cover. Openings in the covers shall be permanently guarded with metal grids designed to prevent hands entering the machine. Covers shall have safety interlock to shut off power if cover is removed.

**7.4.3** Permanently joined inlets that introduce solids or semisolids that may become plugged during operation shall be of a configuration not to endanger hands during cleaning.

**7.4.4** Mixers that are subject to jamming with solids shall have protective devices which automatically shut off the machine's power to prevent overload. The machine must then be manually restarted by the operator.

**7.4.5** Mixers that automatically start up shall have warning signs posted and a visual and/or audible alert designed to sound for 3 seconds before the machine starts.

**7.4.6** Dividers attached directly to mixers must be guarded, and shall not have shear points that may endanger the operator.

**7.4.7** Any device or mechanism used to adjust dividers during operation shall not endanger the operator or require operator to use hands near moving parts or pinch points.

**7.4.8** A lockable power and compressed air disconnect switch must be located on the machine to prevent activation during cleaning or servicing.

**7.4.9** Entire machine and electrical controls shall be designed for wash-down service.

## **7.5 Premixers and Emulsifiers**

**7.5.1** Premixers and emulsifiers shall be equipped with covers having a safety interlock which stops the machine when the cover is raised or opened.

**7.5.2** Machines intended for batch-type operation, where small ingredients are added manually, shall be so equipped that ingredients may be added without exposing the operator to the moving agitator. Openings in the covers shall be permanently guarded with metal grids designed to prevent hands from entering the machine.

**7.5.3** A lockable power disconnect and compressed air switch must be located on the machine to prevent activation during cleaning or servicing.

**7.5.4** Entire machine and electrical controls shall be designed for wash-down service.

## **8. Makeup Equipment**

### **8.1 Trough, Bowl Hoists, and Elevators**

**8.1.1** The manufacture, maintenance, and operation of hoist equipment shall conform to American National Standard Safety Standard for Overhead Hoists (Underhung), ANSI B30.16, where applicable.

**8.1.2** Leg-type trough hoists designed to pick up both ends of the trough simultaneously shall have the rated load capacity marked on one leg of the trough hoist.

**8.1.3** Leg-type trough hoists or elevators designed to pick up both ends of the trough simultaneously should have a device to automatically stop the down travel of the trough 4 ft (1.22 m) from the floor, so that it will be necessary for an operator to ensure that all is clear underneath the trough before starting it on the down travel for the last 4 ft (1.22 m). The trough elevator equipped with a chain-type lifting mechanism shall be provided with instantaneous safeties to prevent the trough from dropping in case of chain failure.

**8.1.4** Trough elevators equipped with a screw-type lifting mechanism shall have the mechanism guarded to a height of 7 ft (2.13 m) from the floor. This also applies to chain-type lifting mechanisms having such pinch points.

**8.1.5** Safety latches shall be used on all hoist hooks and the rated load capacity of the hoist shall be prominently marked and readily visible from the operator's position. Paragraph 8.1.1 shall apply. The hoist's maximum capacity shall not exceed the structural support for it.

**8.1.6** Slings or tackle used with hoists shall be constructed and used in conformance with American National Standard Safety Standard for Slings, ANSI/ASME B30.9.

**8.1.7** The rated load capacity shall be indicated on each sling.

**8.1.8** Slings having hook assemblies shall be provided with safety hooks.

**8.1.9** All associated Lock Out Tag Out points including pneumatics/hydraulics/electrical have proper disconnects.

**8.1.10** Prior to trough dual contact interlocks are in place to prevent a lift of trough not properly seated in the trough cradle.

**8.1.11** All access doors which expose harm have proper safety interlocks to prevent harm.

### **8.2 Dividers - Dough**

**8.2.1 Guards.** Provision shall be made for making the weight adjustment while the divider is operating, without the removal of any guards.

**8.2.2 Rear of divider.** The back of dividers with hazardous moving parts shall have a complete cover to enclose all of the moving parts, or each individual part shall be enclosed or guarded to remove the separate hazards. The rear cover shall be provided with a safety interlock in order that the machine cannot operate when this cover is open. The cover on the back shall be hinged so that it cannot be completely removed, and if a catch or brace is provided for holding the cover open, it shall be designed so that it will not release due to vibrations or minor bumping whereby the cover may drop.

**8.2.3 Oil Holes in Knife.** The oil holes in the knife shall be of such size that fingers cannot enter holes.

**8.2.4 Knife Actuating Arm.** There shall be a protective device on any elongated hole in the knife actuating arm at the back of the divider exposed during normal operation.

**8.2.5 Divider Conveyors.** Pertinent provisions of 4.3 shall apply to divider conveyors.

**8.2.6 Rotary Single Pocket Dividers, Extruder Dividers and Chunkers.** There shall be proper guarding of the rotating screw, vane, knife, or cylinder on this type of divider so as to restrict a person from reaching into the moving parts while the machine is running. A safety interlock on the safety guards or other means shall be provided to immediately brake the machine to a complete stop if this area is entered or the guard is opened.

**8.2.7** All associated Lock Out Tag Out points including pneumatics/hydraulics/electrical have proper disconnects.

**8.2.8** All access doors which expose harm have proper safety interlocks to prevent harm.

**8.2.9** Dual hand controls are required to properly start the machine.

### **8.3 Rounders**

A prominently displayed warning sign shall be posted on the machine to alert personnel to keep hands free of rotating parts.

### **8.4 Moulders**

**8.4.1 Hoppers.** Mechanically fed molders shall be provided with hoppers so designed and constructed to the molder that an employee's hand cannot get into the hopper where it will come in contact with the in-running rolls.

**8.4.2 Hand-Fed Moulders.** Hand-fed molders shall be provided with a belt-feed device, or the hopper shall be extended high enough that the hands of the operator cannot get into the

feed rolls. The top edge of such a hopper shall be well rounded to prevent injury when it is struck or bumped.

**8.4.3 Stopping Devices.** On hand-fed molders, there shall be a stopping device within easy reach of the operator who feeds the molder, and another stopping device within the reach of the employee taking the dough away from the moulder.

**8.4.4 Cleanout Holes.** Machines shall be so designed that there is no shear point in close proximity to the cleanout holes.

**8.4.5 Adjustment Crank.** Where a removable crank is used to adjust the molder, a safety interlock shall be provided to stop the machine prior to the crank engaging any rotating adjusting shaft.

**8.4.6 Access Doors and Covers.** Access doors and covers shall be hinged or held captive.

**8.4.7 Moulder Conveyors.** Pertinent provisions of 4.3 shall apply to moulder conveyors.

## **8.5 Rotary Machines.**

**8.5.1** The nip point of the engraved die and the dough feed roll of manually fed machines shall be guarded while the machine is in operation. The guard or guards shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle. Guards shall be permanently located or provided with a safety interlock.

**8.5.2** An emergency stop bar convenient to the operator should be provided on manually fed machines. This bar should be so located that it may be operated by parts of the operator's body other than the hands or arms.

## **8.6 Dough Brakes (Dough Sheeter)**

**8.6.1 Top Roll Protection.** The top roll shall be guarded by a heavy shield extending over the top roll to go within 6 in (152.4 mm) of the hopper bottom board and a horizontal distance from the rolls to restrict the operator's hands from getting into the rolls.

**8.6.2 Emergency Stop Bar.** An emergency stop bar shall be provided, so located that the body will press against it if the operator slips and falls towards the rolls, or if the operator gets his hands caught in the rolls, and this pressure shall positively open a circuit which will de-energize the drive motor. In addition, a brake shall be activated at the same time, causing the rolls to stop as soon as is practical while reducing the risk of injury. The safety device shall be checked by each operator prior to operating the machine.

**8.6.3 Reversible Dough Brakes.** Reversible brakes shall be provided with a guard or tripping mechanism on each side of the rolls. These tripping mechanisms shall be so arranged as to stop the machine or reverse the direction of the rolls so that they are out-running if the guard is moved by contact of the operator.

**8.6.4 Cross-Roll Brakes.** Cross-roll brakes shall be provided with guards that are similar in number and equal in effectiveness to guards stipulated in 8.6.1 and 8.6.2.

## **8.7 Sheeters, Laminators, and Cutters**

**8.7.1** Drive roll gears shall be guarded.

**8.7.2** Reciprocating and traversing mechanisms shall be guarded to prevent injury between moving and stationary parts.

**8.7.3** The nip points of exposed rolls shall be guarded. The guard should permit vision of the rolls.

**8.7.4** Reciprocating cutters and embossing heads shall be guarded on the feed and discharge ends.

**8.7.5** Rotary cutters shall be guarded on the feed end.

**8.7.6** Motor controls and drive clutches should be located adjacent to the cutter or embossing head.

**8.7.7** Hoppers for hand-fed sheeter rolls shall have a safety interlock stop bar or other stopping device at the infeed of the rolls.

**8.7.8** Band traversing cutters shall be guarded in the vertical run on both sides of the band.

## **8.8 Extruders, Degassers, and Pumps**

**8.8.1** Portable units equipped with wheels and casters shall have anti-friction type wheels and casters with floor locks or a means of securing the unit in a fixed position during operation.

**8.8.2** Manually fed hoppers shall be provided with a grid or parallel bars to protect the employee from bodily injury.

**8.8.3** Readily removable hoppers shall be equipped with a safety interlock.

## **8.9 Bar, Wirecut and Pretzel Machines**

**8.9.1** Portable units equipped with wheels and casters shall have anti-friction (ball or roller bearing) type wheels and casters with floor locks or a means of securing the unit in a fixed position during operation.

**8.9.2** Manually fed hoppers shall be provided with guards covering the hopper opening to prevent the operator from coming in contact with knives, cutters or feed mechanisms, and use appropriate interlocks or stop bars.

**8.9.3** Readily removable hoppers shall be equipped with a safety interlock.

## **8.10 Panning and Peeling Machines**

**8.10.1** Rolls and hoppers shall be guarded to prevent injury at the point where the dough enters the rolls by one of the following:

(1) Mechanical guard to prevent any part of the person from being caught in the nip point of the rolls.

(2) Automatic stop bar designed to stop the machine before the operator's hands can be caught in the rolls.

**8.10.2** Guards shall be provided at each side of the cutter to prevent the operator's hands from getting under the cutter.

**8.10.3** Reciprocating cutter heads shall be guarded to protect the operator from being caught between the moving and stationary parts.

**8.10.4** Motor controls and drive clutch shall be located adjacent to the cutting head.

## **8.11 Cake Depositors**

A means shall be provided to protect the operator from injury caused by the machine's mechanism at the bottom of the filling hopper on batch type machines.

## 8.12 Topping Machines

A means shall be provided to protect the operator from injury caused by the machine's mechanism at the bottom of the dispensing hopper and when manually filling a hopper.

## 8.13 Bun and Roll Makeup Equipment

The rotary-drum-type divider shall be provided with a rear cover and safety interlock so that the machine cannot be operated when the cover is not in place.

# 9. Ovens and Product Dryers

## 9.1 Location, Design, and Construction

**9.1.1** Class A ovens and dryers, except those covered in 9.1.2, shall be designed, constructed, and located as prescribed in ANSI/NFPA 86, for Ovens and Furnaces and OSHA CFR 29, section 1910.263(l).

**9.1.2** Ovens and dryers such as range and cabinet ovens, which are certified as complying with applicable American National Standards, shall be constructed and installed in accordance with the terms of the applicable standards.

**9.1.3** Ovens and dryers that are contained within an enclosure equipped with walk-in entrance doors shall have those doors electrically interlocked so that conveyors shall immediately stop and the gas train shall immediately perform an emergency shut down when any door is open.

**9.1.3.1** Entrance door safety interlocks shall use listed safety components to accomplish a SIL 2 safety level.

**9.1.3.2** A key-operated electric switch, located just outside a walk-in door may be provided as an option so that an authorized person may open the walk-in door without stopping the conveyors and burner systems.

**9.1.3.2.1** The key-operated bypass switch shall only bypass the safety interlock of the door the switch is adjacent to and shall not bypass the door safety interlock on any other door.

**9.1.3.3** A momentary normally open push-button electrical switch may be located outside a walk-in door to keep the conveyors and burner system operating while the walk-in door is open. Releasing the button while that door is open shall cause the conveyors to immediately stop and the gas train shall perform an immediate emergency shut down.

**9.1.3.3.1** The momentary bypass button shall only bypass the safety interlock of the door the button is adjacent to and shall not bypass the door safety interlock on any other door.

**9.1.3.3.2** The function of any momentary bypass button shall be time limited by the control system to no more than 15 seconds to prevent a failed, jammed, or bypassed button from creating a safety hazard. Expiration of the time limit shall have the same effect as releasing the button while the door is open.

**9.1.3.3.3** The conveyor and burner systems shall only be restarted if all walk-in doors are closed and all momentary door safety bypass buttons are released.

**9.1.3.4** Any entrance door equipped with a bypass switch and/or button in accordance with 9.1.3.2 and/or 9.1.3.3 shall also have an emergency stop button mounted in the same enclosure as the bypass switch and/or button. Activation of the emergency

stop button shall cause the conveyors to immediately stop and the gas train shall perform an immediate emergency shut down.

**9.1.3.5** A warning sign shall be prominently displayed near each walk-in door on the enclosure cautioning personnel not to enter the enclosure while the conveyor or burner systems are active. There shall be a flashing light, prominently located and activated at any time any door to the enclosure is open while the conveyor or burner systems are active.

## 9.2 Fuel Gas Supply

**9.2.1** Gas piping and valves serving ovens and dryers shall be installed in accordance with the National Fuel Gas Code, - ANSI Z223.1/NFPA 54, and the ANSI/NFPA 86 Standard for Ovens and Furnaces.

**9.2.2** Installation of liquified petroleum gas storage and handling systems used to supply ovens and dryers shall be made in accordance with the Liquified Petroleum Gas Code ANSI/NFPA 58, and the ANSI/NFPA 86 Standard for Ovens and Furnaces.

## 9.3 Fuel Oil Supply

Installation of oil storage tanks, piping, and valves serving ovens and dryers shall be in accordance with standard for the Installation of Oil Burning Equipment, - ANSI/NFPA 31 and the ANSI/NFPA 86 Standard for Ovens and Furnaces.

## 9.4 Electric Supply

All parts of the electrical installation serving ovens and dryers shall be in accordance with 4.4.

## 9.5 Initial Operation of Equipment

**9.5.1** Before initially placing the equipment in operation it shall be determined that all protective devices are connected and operative; the installation is capable of safe operation; the oven or dryer has been purged in accordance with the manufacturer's instructions; and all interested persons have been notified.

**9.5.2** The initial start shall be conducted in accordance with the manufacturer's instructions and applicable safety requirements. Where practical, oven or dryer loading doors shall be opened before ignition is applied.

**9.5.3** Installed protective devices shall, and other instruments and control devices should, be checked under operating conditions as promptly as possible to determine proper functioning. Equipment shall be shut down immediately if any defect is noted during initial startup or operation. Defects shall be corrected before the equipment is again started. In shutting down, the manufacturer's instructions and applicable safety requirements shall be followed.

## 9.6 Acceptance Tests and Operating Instructions

**9.6.1** An acceptance test shall be conducted upon commissioning if necessary to establish compliance with applicable codes or requirements of authorities having jurisdiction.

**9.6.2** The manufacturer's written operating instructions shall be provided by the equipment supplier to the buyer. The buyer

shall be instructed by a qualified instructor in their use in order to ensure a safe and satisfactory operation of the equipment.

### **9.7 Maintenance Program**

**9.7.1** Ovens, dryers and auxiliary equipment shall be maintained in accordance with the manufacturer's safety instructions.

**9.7.2** All safety controls shall be regularly inspected and tested for proper operation. The inspection and testing interval and required inspectors shall be at minimum as prescribed in the ANSI/NFPA 86 and OSHA CFR 29, sections 1910.263(l)(9)(i) and 1910.263.(l)(9)(ii). ANSI/NFPA 86 Annex C manufacturer's recommendations-and ANSI Z223.-1/NFPA 54 should be used as a guide for establishing an inspection schedule, preparing a test report form, and recording.

## **10. Loaders and Unloaders**

### **10.1 Bar Loaders**

All bar loaders shall be equipped with a suitable safety device such as but not limited to safety interlocks, presence sensing light guards, excessive tension sensor, or emergency stop buttons to stop the loader in the event employees are exposed to hazards and if the loader becomes obstructed.

### **10.2 Portable Loader and Unloader Assemblies**

Portable loader and unloader assemblies shall be stable and have a locking or clamping device to prevent movement during operation.

### **10.3 Overhead**

Overhead protection, such as a suitable safety device, shall be installed and designed to stop the equipment immediately in case of conveyor malfunction and product and or pan accumulation and back-up. When product and or pans travel overhead of work stations or traffic areas, a suitable and substantial means to catch objects from falling into the work area below shall be installed.

### **10.4 Guarding**

Loaders and Unloaders shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 and Electrical installations identified in Section 4.4.

## **11. Depanners**

Depanners shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2, and Electrical installations identified in Section 4.4.

## **12. Frying Equipment**

### **12.1 Automatic Frying Machine**

The automatic frying machine may be used to fry donuts, pies, and honey buns and is generally equipped with feed devices, hoods, exhausters, and ducts.

#### **12.1.1 Design and construction**

**12.1.1.1** Design, installation and maintenance of all gas fired fryers including hoods, grease removal devices, exhaust duct systems, and fire extinguishing systems must comply with NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2017 or most recent or the authority having jurisdiction.

**12.1.1.2** Regular cleaning practices and cleaning frequencies that comply with manufacturers' recommendations shall be implemented to avoid equipment malfunction and fires. Employees involved in fryer cleaning operations shall be provided with training, appropriate materials and tools and appropriate personal protective equipment.

**12.1.1.3** All frying machines shall be either insulated or properly guarded at necessary locations to prevent burns to persons. Side-mounted heat shields or guards shall be installed to prevent accidental burns from direct contact with fryer kettle and hot oil.

**12.1.1.4** High oil level control and safety devices shall prevent possible overflow.

**12.1.1.5** Where live flame is used to heat the fat, the machine shall be equipped with properly designed flues to carry off products of combustion.

**12.1.1.6** Automatic thermostats shall be installed to control frying temperatures.

**12.1.1.7** Temperature probes shall be provided in all exhaust stack zones and temperature probes should constantly sense exhaust temperature to ensure the upper limit of the stack material rating is not reached during operation. This device shall be preset at the factory at a temperature below the flash point of the frying medium and shall be of a manual reset type. This shall be a secondary device and not a dual function of the fryer thermostat(s).

**12.1.1.8** The machine shall be equipped with a low level safety device to prevent the heating of frying fat until there is sufficient oil coverage of heating tubes or heating elements. Low oil level control and safety devices shall prevent combustion or cause shutdown should the oil level not sufficiently remain above the flame tubes.

**12.1.1.9** Safe failure mode shall be incorporated into the fryer operating system to ensure fryer shut down in the event any of safety sensors are removed, bypassed or fails.

**12.1.1.10** If forced draft is used or automatic damper, or both, for exhausting products of combustion, the machine shall be equipped with interlocking controls to prevent ignition of the burners until the exhauster is functioning.

**12.1.1.11** If the machine is designed with a voluminous, closed combustion chamber (no secondary air, premix air gas), a time delay relay shall be used in connection with the exhauster, to purge the chamber before the burner can be ignited.

**12.1.1.12** Where cutter heads are provided, a readily accessible stop switch or clutch shall be installed at the cutter.

**12.1.1.13** Automatic frying equipment, which are certified as complying with applicable American National Standards, shall be constructed and installed in accordance with the terms of the applicable standards.

## **12.2 Installation**

Gas piping and valves serving fryers shall be installed in accordance with ANSI Z223.1/NFPA 54.

**12.2.1 Duct System** A duct system shall be installed in conformance with ANSI/NFPA 96, American National Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.

### **12.2.2 Machine Installation**

(1) The machine should be installed on a noncombustible floor. If this type of floor is not available, the machine shall be raised a minimum of 6 in (152.4 mm), and a metal pan flanged on four sides shall be installed under the legs of the machine.

(2) Machine shall be readily accessible from all sides [3 ft (0.91 m)] except where other equipment is required to be connected thereto.

(3) The floor shall be maintained around the machine in a nonslip condition.

(4) Steps of metal grate should be used where height makes proper operation awkward or difficult.

(5) Building air pressure shall be monitored in the operating area or operating room when applicable, to ensure relative air pressure always remains slightly positive to prevent back draft of flame into direct fire flame tubes.

**12.2.3 Fire Extinguisher Devices.** Fire extinguisher devices suitable for Class B fires shall be provided and conform to American National Standard for Portable Fire Extinguishers, ANSI/NFPA 10; American National Standard for Dry Chemical Extinguishing Systems, ANSI/NFPA 17; or American National Standard on Carbon Dioxide Extinguishing Systems, ANSI/NFPA 12.

## **12.3 Initial Operation of Equipment**

**12.3.1** Before initially placing the equipment in operation it shall be determined that all protective devices are connected and operative; the installation is capable of safe operation; if gas fired, the fryer must be purged in accordance with the manufacturer's instructions; and all interested persons have been notified and trained.

**12.3.2** The initial start shall be conducted in accordance with the manufacturer's instructions and applicable safety requirements.

**12.3.3** Installed protective devices shall, and other instruments and control devices should, be checked under operating conditions as promptly as possible to determine proper functioning. Equipment shall be shut down immediately if any defect is noted during initial startup or operation. Defects shall be corrected before the equipment is again started. In shutting down, the manufacturer's instructions and applicable safety requirements shall be followed.

## **12.4 Operation**

**12.4.1** Written operating instructions, as supplied by the equipment manufacturers, shall be delivered to the user, and the operator shall be instructed in the use of the equipment by a qualified person.

**12.4.2** A nonheat-conducting implement shall be provided to remove damaged product from the fryer.

## **12.5 Maintenance**

**12.5.1** Fryers and auxiliary equipment shall be maintained in accordance with the manufacturer's instructions and good operating practices.

**12.5.2** The following should be performed on a periodic basis:

(1) Fryer properly cleaned of all accumulated gum or other substances to prevent fire.

(2) All controls checked for proper operation.

(3) All gas burners and heating elements cleaned of dirt and dust, and adjusted for proper operation.

(4) Ducts shall be inspected and cleaned.

(5) Fire suppression systems tested and serviced.

(6) All safety devices tested and any deficiencies corrected.

**12.5.3** An acceptance test shall be conducted upon commissioning to establish compliance with applicable codes or requirements of authorities having jurisdiction.

## **12.6 Indirect Heated Fryers**

Indirect heating may be of the pressure-type or nonpressure-type.

(1) *Nonpressure-Type.* A nonpressure-type system is one where there is no pressure in the system when the circulating pump is not in operation, regardless of the heat transfer fluid temperature.

(2) *Pressure-Type.* A pressure-type system is one where hot transfer fluid causes the pressure, even when the circulating pump is not in operation.

### **12.6.1 Nonpressure-Type Systems**

**12.6.1.1** When a separate heat exchanger is used, the unit shall be designed in conformance with 12.1 and applicable sections of 12.1.1 and in conformance with 12.2.1, 12.2.2 and 12.2.3.

**12.6.1.2** To prevent heat transfer fluid from leaking into the fryer fat, welded seams of the plate coils on the frying kettle shall not be contiguous with welded seams of the kettle proper.

**12.6.2 Pressure-Type Systems.** Paragraphs 12.6.1.1 and 12.6.1.2 shall apply, and the installation of the pressure system shall conform to the applicable sections of the American National Standard Power Piping, ANSI/ASME B31.1.

## **12.7 Open Frying Kettles**

**12.7.1** Except for a variation in configuration or size, open kettle machines are essentially the same as hotel and deep fat fryers, and the applicable parts of 6.3 shall apply.

**12.7.2** Open frying kettles shall be constructed and installed according to the applicable sections of American National Standard for Gas Food Service Equipment - Deep Fat Fryers, ANSI Z83.13.

**12.7.3** Based on the flashpoint of the oil used in the fryer, heating element maximum temperature, and oil setpoint temperature shall be limited and adjusted so that safe operating temperatures are maintained and not exceeded.

## **12.8 Fat Filters**

**12.8.1** Filters operated under pressure shall comply with the ANSI/ASME Boiler and Pressure Vessel Code, Section VIII.

**12.8.2** The pumping system pressure shall be monitored at a position directly prior to and directly after the filter by a device such as a pressure switch or transducer that will automatically shut off the pumping system when pressures become excessive. There shall also be a safe method of releasing stored pressure before opening the pumping system or closed piping loop.

**12.8.3** A warning sign shall be prominently displayed at each filter location, alerting the operator to the danger if hot oil that could be spilled or splashed.

**12.8.4** In the case of portable filters where hot fat is discharged through a nozzle, an insulated handle shall be provided offset to the nozzle flow.

**12.8.5** Casters shall be provided on portable filters which are equipped with locking devices to prevent movement away from the discharge point during operation.

**12.8.6** Hoses on filters shall be of such quality that they will not break down during normal operations, even down periods.

**12.8.7** Hand protection shall be provided for the operator handling hot fat filters.

## **13. Coolers and Proofers**

### **13.1 Coolers**

#### **13.1.1 Portable Rack, Floor or Overhead Rail Type**

**13.1.1.1** Guide rails shall be provided in the cooler to center the rack as it enters and leaves the enclosure.

**13.1.1.2** All door latches shall be operable from inside and outside of the enclosure.

#### **13.1.2 Mechanical Rack, Tray, and Conveyor Types**

**13.1.2.1** Where a separate enclosure is used, enclosures or housing for Proofers shall meet OSHA and NFPA codes for building enclosures. A door latches shall be operable from both inside and outside.

**13.1.2.2** Cooler drives, loading areas, and unloading areas shall be guarded as required under 4.2 or guarded by location.

**13.1.2.3** Elevated walkways around coolers shall have standard rails and toeboards completely around the outside edge, and at locations along the inside edge where lack of framing would permit a fall into the interior. Walkways should have a solid nonskid surface. Walkways through cooler legs shall have standard rails and toeboards.

**13.1.2.4** Cooler drives shall be equipped with an overload device to stop the cooler with a minimum of coasting in the event of a jam in the cooler. The cooler is to be restarted manually from the master control station.

**13.1.2.5** Safety devices that stop any part of the cooler, owing to the desirable location of the product carried, shall be so designed that the stopped unit will not automatically restart upon

manual correction of the fault, but must be restarted manually from the master control station.

**13.1.2.6** A cooler when in a dwell condition, and which will automatically restart, shall be equipped with a warning sign that this condition exists.

**13.1.2.7** Conveyorized coolers and proofers that are contained within an enclosure equipped with walk-in entrance doors shall have these doors electrically interlocked so that the conveyors will quickly stop when the door is opened. A key-operated electric switch, located just outside the walk-in door(s) may be provided as an option, so that an authorized person can open the walk-in door for inspection purposes without stopping the conveyor system.

A maintained-contact, push-button, electrical switch may be located outside the walk-in door to keep the conveyor running while the walk-in door is open for a visual inspection and the inspector is standing outside the enclosure. Releasing the button while the door is open would cause the conveyor to stop. The conveyor can only be restarted from the single start station and only if the walk-in doors are closed.

A warning sign shall be prominently displayed near each walk-in door on the enclosure, cautioning personnel not to enter the enclosure while it is running. There shall be a flashing light, prominently located and activated at any time the door to the enclosure is open while the conveyors are running.

### **13.2 Proofers**

#### **13.2.1 Portable Rack, Floor or Overhead Rail Type.**

Paragraphs 13.1.1.1 and 13.1.1.2 on coolers shall apply.

#### **13.2.2 Mechanical Rack, Tray and Conveyor Type.**

Paragraphs 13.1.1.2, 13.1.2.1, 13.1.2.2, 13.1.2.3, 13.1.2.4, 13.1.2.5, and 13.1.2.6 shall apply.

**13.2.2.1** Elevated walkways, when provided, around the outside of a proofer enclosure shall have standard rails and toeboards.

Walkways around the proofer, within the enclosure, shall have standard rails and toeboards where lack of framing would permit a fall into the interior.

Walkways through proofer legs shall have standard rails and toeboards.

**13.2.2.2** Overhead air-conditioning units, other than those mounted on top of the proofer enclosure, shall have walkways or platforms, or both.

## **14. Icing and Enrobing Equipment**

### **14.1 Icing and Enrobing**

Machines having hoppers with power-driven agitators, rollers, or other moving parts shall be equipped with a readily accessible stop switch that can be locked out during repair.

**14.1.1** When these moving parts will create a pinch point between two surfaces consideration should be given to general requirements for machine guards. All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements

identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

#### **14.2 Melting, Tempering, and Mixing Kettles**

**14.2.1** Each kettle shall be provided with a cover to enclose the top of the kettle.

**14.2.2** All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

**14.2.3** Positive locking devices shall be provided to hold kettles in the desired position.

**14.2.4** Kettles with steam jackets shall be provided with safety valves in accordance with the code for unified pressure vessels as given in the ANSI/ASME Boiler and Pressure vessel Code, Section VIII.

**14.2.5** If hand filling ingredients, there should be a means of ergonomically transferring ingredients (i.e., lift table or the like).

#### **14.3 Filling, Injectors, and Sandwich Machines**

**14.3.1** Machines having hoppers with power-driven agitators or other moving parts shall be equipped with a readily accessible stop switch that can be locked out during repair.

**14.3.2** Agitators weighing in excess of 80 lb (36.28 kg) should be installed such that they can be swung up out of the way to permit removal of the hopper.

**14.3.3** Machine hoppers which are removable and weighing in excess of 80 lb (36.28 kg) should be provided with a hoist overhead to facilitate handling and prevent the necessity of the operator lifting the hopper.

**14.3.4** Steps of metal grate type should be used where height makes proper operation awkward or difficult.

**14.3.5** Pumps should be used to transfer icing and filling into the machine hoppers.

**14.3.6** Hot water or steam-jacketed hoppers shall be provided with pressure/temperature relief valves or energy cut-out devices designed to operate at the proper setting. The jacketed hopper shall be protected to prevent burns to persons.

**14.3.7** Connecting conveyors shall be constructed to the requirements of the applicable paragraphs of 4.3.

**14.3.8** A means shall be provided to protect the operator from injury caused by the machine's mechanism at the bottom of the filling hopper on batch-type machines regardless of whether the hopper is hand or continuously filled.

**14.3.9** The filling and injector nozzle area shall be adequately guarded so that the machine shuts off if someone reaches into this area.

**14.3.10** If products are filled in pans, there should be a control to shut off the machine if the pan is not in the correct position for filling on manually pan fed machines.

**14.3.11** All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

### **15. Pan Washers and Pan Greasers**

#### **15.1 Design and Construction**

**15.1.1** The electrical wiring shall be in accordance with 4.4 of this standard, and electrical control enclosures shall be NEMA 4 where exposed to moisture.

**15.1.2** Pan dryers shall conform to ANSI/NFPA 86.

**15.1.3** All safety controls shall be regularly inspected for proper operation and conform to the applicable sections of ANSI/NFPA 86.

**15.1.4** All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

**15.1.5** Machines shall be designed to prevent overspray from hitting the operator with guarding to keep all sprays within the machine, protecting operators from possible contact.

**15.1.6** Interior walkways inside machines shall be provided with skidproof grating with toeboard and guard rails.

**15.1.7** An emergency release mechanism shall be provided on the inside of the door of any machine that an operator is required to enter.

**15.1.8** A safety interlocking device shall be provided on batch-type machines to stop machine operation, with the exception of the vent fan, if the door is opened during operation.

**15.1.9** Overflow and drain standpipes shall be arranged to prevent backflow of liquids from hitting the operator.

#### **15.2 Installation**

**15.2.1** If steam and vapor are present, the machine shall have provisions for a power exhaust unit.

**15.2.2** Machines shall be provided with a lockout safety device on the main disconnect switch and proper signs to indicate when the machine is being cleaned or maintained. All power sources shall be labeled and able to be locked out.

**15.2.3** All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

**15.2.4** Floor drains, of a size designated by the local building or health codes, shall be installed for pan washers.

**15.2.5** Work platforms, where required, shall be located 42 in (1066.8 mm) below the top of open tanks and the platform guarded with a 42-in (1066.8 mm) guardrail. All work platform surfaces and floor surfaces shall be maintained in a nonslip condition.

**15.2.6** Exterior loading ramps to rack washers should not be used where possible. If a ramp is needed, it shall have a slip resistant surface.

### **16. Pan Stackers and Unstackers**

Pan stackers and unstackers shall be designed, constructed and installed in accordance with 4.2, 4.3.1, 4.3.4, and 4.4.

## 17. Slicing Machines

All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

### 17.1 Slicing and Wafer Cutters

**17.1.1** All bread slicing machines shall be provided with a mechanical device designed to safely push the last loaf through the slicer knives without contacting the moving knives.

**17.1.2** The cover over the knife frames of reciprocating blade slicers shall be provided with a safety interlock device so that the machine cannot operate unless the cover is in place.

**17.1.3** On slicer with endless band knives, the drive motor shall be equipped with automatic braking which will instantly stop the motor. Each door, panel, or other point of access to the cutting blades shall be provided with a safety interlock so that the drive motor will stop if any such access points are opened, and so that the motor cannot be restarted while these panels or doors remain open. Restarting shall require manual activation of the start control.

**17.1.4** On slicers with endless band knives, a safety device shall be provided that is tripped by a moving broken knife, where thereby causes the drive motor to make a instant braked stop.

**17.1.5** Bread slicers with endless band blades shall not be sharpened with a hand-held hone.

**17.1.6** Slicers that are mounted over conveyors and hinged to allow the operator to raise the unit shall be provided with an electrical safety interlock to stop the blades from operating when in the raised position.

**17.1.7** Product entry or exit points to slicer shall be guarded by extended length covers to prevent the operator reaching in the opening and contacting slicer blades. These covers must be connected with an electrical safety interlock that will prevent operation if cover is removed or lifted.

**17.1.8** A lockable power and compressed air disconnect switch must be located on the machine to prevent activation during cleaning or servicing.

### 17.2 Slicing, Wrapping and Bagging Machine Connections

**17.2.1** The shear point at the opening for the slicer flight at the discharge end of the flight chain shall be protected by a hinged safety plate or guard that is electrically interlocked, or otherwise arranged to prevent workers from getting hands or fingers into the hazard areas.

**17.2.2** All pinch points at conveyor transfer points shall be guarded or otherwise protected.

**17.2.3** Since slicing and wrapping or bagging machines are usually used as a single unit, but may be purchased from separate manufacturers, the purchaser shall ensure that the machines are so installed and connected that the chains, sprockets, belts, and moving parts are guarded. The purchaser

shall also be responsible for safe interconnections of starting and stopping devices. Section 4 of this standard applies.

**17.2.4** Mechanical clutch levers or electrical push-button motor controls for starting and stopping both slicing machine conveyors and wrapping or bagging machines shall be so arranged that an operator in one location only can start and stop both machines but can stop the machines at more than one station.

**17.2.5** When operator pushes start button there shall be 3 second delay with a visual and/or audible alert designed to notify other operators that machine is starting.

**17.2.6** A lockable power and compressed air disconnect switch must be located on the machine to prevent activation during cleaning or servicing.

## 18. Packaging Equipment

All equipment identified and referenced in this section, shall be designed, constructed, and installed in accordance with all applicable guarding requirements identified in Section 4.2 of this standard and 29 CFR 1910 Subpart O – Machinery and Machine Guarding.

### 18.1 Wrapping Machines

**18.1.1** Electric sealing heaters and heated sealing surfaces shall be insulated or guarded, and a prominently displayed warning sign shall be provided.

**18.1.2** Power-driven friction film feed rollers shall be provided with a guard over the in-running nip point of the revolving rollers.

**18.1.3** If more than one operator is manually feeding products into the wrapping machine, then emergency type electric stop button stations or other equally effective means shall be installed at easily reached line of sight locations for quick stopping of the machine by any operators. Only one electric start button station shall be provided.

### 18.2 Carton Wrapping and Bundling Machines

**18.2.1** Electrical sealing heaters and heated sealing surfaces shall be insulated or guarded, and a prominently displayed warning sign shall be provided.

**18.2.2** Hot surfaces of glue pots and dispensers shall be covered or guarded, and a prominently displayed warning sign shall be provided. A guard shall be provided to prevent accidental dispersement of hot adhesive from the applicator, injuring personnel.

**18.2.3** Power-driven film or label feed rollers shall be guarded over the in-running nip point of the revolving rollers.

**18.2.4** The end-seal drums on carton and bundling machines shall be guarded.

**18.2.5** Hazardous conditions caused by the motion of flight chains, pusher bars, or pusher fingers shall be guarded.

**18.2.6** Access covers provided for cleaning or servicing of flight chains or other moving parts shall be provided with a safety interlock.

**18.2.7** Safety switches used to detect jams of product flow on packaging equipment shall have a manual reset to prevent

starting of the machine until the person removing the jam is clear of the machine.

**18.2.8** If more than one operator is manually feeding products into the wrapping machine, then emergency type electric stop button stations or other equally effective means shall be installed at easily reached line of sight locations for quick stopping of the machine by any operator.

**18.2.8.1** Only one electric start button station shall be provided, and a suitable warning device, such as a horn or buzzer, shall be utilized to alert personnel working on the line that the equipment is to be started.

**18.2.8.2** On large machines where personnel working on the machine may be obscured from the vision of the operator, safety lock-out switches shall be provided at crucial points.

**18.2.8.3** If more than one machine is used as a single unit, moving drive and connecting parts shall be guarded, and safe interconnections of starting and stopping devices shall be provided.

### **18.3 Bag Loading Machines**

**18.3.1** The bag magazine feed and the funnel sections shall be guarded by a movable panel or guard which shall be provided with a safety interlock that will stop motion of all parts when the panel or guard is in the open position.

**18.3.2** Tying machines for the twist lock shall be guarded so that the twisting hook cannot be reached by the operator with his fingers.

**18.3.3** If more than one operator is manually feeding products into the wrapping machine, then emergency type electric stop button stations or other equally effective means shall be installed at easily reached line of sight locations for quick stopping of the machine by any operators. Only one electric start button station shall be provided.

### **18.4 Form-Fill-Seal Pouch or Bag Machine**

**18.4.1** Drawbar parts shall be safeguarded by extended frame structure, or hinged or movable guards. If transparent, the material shall be shatter resistant or protected against breakage.

**18.4.2** Exposed hot long-seam sealer parts shall be guarded, or a prominently displayed warning sign shall be provided.

**18.4.3** Power-driven friction film feed rollers shall be provided with a guard over the in-running nip point of the revolving rollers.

**18.4.4** If more than one operator is manually feeding products into the wrapping machine, then emergency type electric stop button stations or other equally effective means shall be installed at easily reached line of sight locations for quick stopping of the machine by any operator. The machine, once stopped, shall not start automatically, and only one electric start button shall be provided.

**18.4.5** Overhead extended rotating feed hoppers on revolving turrets shall be guarded or provided with removable pans to prevent product and machine parts from falling on operators. Rotating parts shall be guarded.

### **18.5 Tray or Carton Forming Machines and Carton Closing Machines**

**18.5.1** The carton former and carton corner lock section shall be guarded with hinged or readily removable guards and safety interlock switches.

**18.5.2** Hot surfaces of glue pots and dispensers shall be covered or guarded, or a prominently displayed warning sign shall be provided. A guard shall be provided to prevent accidental dispersment of hot adhesive from the applicator, which could injure personnel.

**18.5.3** If more than one machine is used as a single unit, then the employer shall be responsible for properly guarding moving drive and connecting parts, and for safe interconnections of starting and stopping devices.

### **18.6 Carton and Lining Feeding Mechanisms**

Cutting knives shall be provided with proper guarding.

### **18.7 Fiber Box Stitchers (Wire Stitchers)**

Means shall be provided to prevent operators from getting fingers caught between the stitching head and the clincher block.

### **18.8 Bulk Packers**

**18.8.1** Power-driven film rollers shall be guarded over the infed nip point of the revolving rollers.

**18.8.2** Electric sealing heaters and heated sealing surfaces shall be insulated or guarded, or a prominently displayed warning sign shall be provided.

**18.8.3** Reciprocating film knives shall be guarded to prevent the operator's hands from getting under the knife.

**18.8.4** If more than one operator is manually feeding products into the wrapping machine, then emergency type electric stop button stations or other equally effective means shall be installed at convenient, easily reached locations for quick stopping of the machine by any operator. Only one electric start button station shall be provided.

**18.8.5** Film roll should be in a convenient location for lifting during changing of film.

## **19. Handling Equipment**

### **19.1 Powered Industrial Trucks**

The manufacture, maintenance and operation of powered industrial trucks shall conform to American National Standard Safety Standard for Low Lift and High Lift Trucks, ANSI/ASME B56.1 and OSHA regulation 29 CFR 1910.178 Powered Industrial Trucks.

### **19.2 Dockboards**

Portable dockboards shall be strong enough to carry the load imposed on them and securely positioned, either by being anchored or by being equipped with devices that will prevent their slipping. The carrying capacity should be plainly marked thereon.

### 19.3 Skids and Pallets

The construction and use of pallets shall conform to American National Standard Pallet Definitions and Terminology, ANSI MH1.1.2, and American National Standard Pallet Sizes, ANSI MH1.2.2.

### 19.4 Hand Trucks

Hand trucks shall be equipped with antifriction bearing (ball or roller bearing) casters of proper size and load rating to permit employees to handle the unit satisfactorily. Casters shall be set back from corners, to be out of the way of toes and heels.

### 19.5 Troughs

Troughs shall be mounted on antifriction bearing (ball or roller bearing) casters, making it possible for the operator to move and direct the motion of the trough with a minimum of effort.

### 19.6 Racks

**19.6.1** Antifriction bearing (ball or roller-bearing) casters shall be used to give the operator better control of the rack.

**19.6.2** All portable racks, except transport racks, shall be equipped with handles so located with reference to the frame of the rack that no part of the operator's hand extends beyond the outer edge of the frame when holding onto the handles.

**19.6.3** Sharp, splintered, or rough corners and edges shall be eliminated.

**19.6.4** End guards shall be used at shelf levels on proofing racks.

**19.6.5** On overhead rail systems, handles for operating devices for trolley switches that hang less than 80 in (2032 mm) from the floor shall be of pliable material.

### 19.7 Basket and Tray Loaders

**19.7.1** Where hinged or readily removable guards are used, they should be equipped with a safety interlock. The operator shall be required to manually restart the machine by energizing a start button after a machine is shut down.

**19.7.2** Transfer devices shall be guarded to prevent an operator from making an adjustment or clearing a malfunction while the machine is in operation.

### 19.8 Pattern Formers

**19.8.1** If of a type presenting a hazard to personnel, all exposed sides shall be guarded. Such guards, if hinged or readily removable, shall be equipped with safety interlocks, and the operator must manually energize a start button to place the machine into operation.

**19.8.2** Entrance and exit points, if of a type that presents a personnel hazard, shall be guarded.

### 19.9 Basket Stackers and Unstackers.

Basket stackers and unstackers shall be designed, constructed, and installed in accordance with 4.2, 4.3.1, 4.3.4, and 4.4.

## 20. Spiral or Tunnel Freezers

### 20.1 Enclosures

Enclosures or housing for walk-in freezers shall meet OSHA and NFPA codes for building enclosures. Emergency exit lighting and signs shall be located to allow employees to be able to safely exit enclosure.

### 20.2 Maintenance and Sanitation

Service and maintenance functions such as sanitation and cleaning operations shall be performed in compliance with the OSHA regulation, 29 CFR 1910.147. See section 3 of this standard for specifics.

### 20.3 Emergency Alerts

Emergency stop buttons shall be provided, and a suitable warning device, such as a horn, buzzer and/ or light, shall be utilized to alert personnel working on the line that the equipment is starting.

### 20.4 Cold Surfaces

Cryogenic-type freezers shall be guarded so as to prevent personnel from accidentally coming into contact with the refrigerant or extremely cold surfaces. Proper signage should be located to be readily visible to all personnel where individuals can enter, or gas may escape. Proper warning devices should be used to warn individuals of possible leaks.

### 20.5 PPE

Proper safety equipment shall be provided and stored in a convenient location outside the freezer for personnel qualified for entry into the equipment. A risk safety analysis shall be completed to evaluate for proper PPE (Personal Protective Equipment), gas / refrigerant detectors, proper ventilation, etc.

### 20.6. Protective Clothing

A prominently displayed warning sign shall be posted outside a walk-in freezer requiring the use of protective clothing. This clothing shall be made available to all personnel.

## 21. Miscellaneous equipment

### 21.1 Pressure Washers

**21.1.1** Pressure washers shall comply with applicable sections of the ASME Boiler and Pressure Vessel Code, Section VIII when applicable.

**21.1.2** Pressure washers used in areas where combustible dust is present shall be equipped with electric motors and controls rated for Class II, Division 2 usage.

**21.1.3** Operators shall be trained how to operate equipment safely before operating pressure washing equipment. Required personal protective equipment shall be worn when using pressure washing equipment.

**21.1.4** Equipment shall be inspected prior to use to identify unsafe conditions, worn or damaged parts. Equipment with damaged, worn or faulty parts shall not be used.

**21.1.5** High pressure nozzles shall not be pointed at or in the direction of other employees.

**21.1.6** A hazard assessment shall be performed to identify appropriate personal protective equipment that shall be worn by the operator.

**21.1.7** Refuel flammable materials in well-ventilated areas with the engine stopped. Gasoline powered equipment must not be overfilled. Propane tanks shall be refilled by a properly trained individual and securely mounted to the equipment.

**21.1.8** Hazardous atmospheres may be created by incomplete combustion of gasoline and propane or other fuels. Operate equipment in well-ventilated areas, do not operate equipment in confined spaces or in poorly ventilated areas.

**21.1.9** Equipment shall not be altered in any manner. If repairs are necessary, follow the manufacturers recommendations and use only approved parts.

**21.1.10** The maximum operating pressure of the lowest rated accessory item shall not be exceeded.

**21.1.11** Pressurized equipment shall not be left unattended.

**21.1.12** Pressure shall be released before any parts are removed or tanks are opened.

## **21.2 Portable Vacuum Cleaners.**

**21.2.1** Vacuum cleaners used in areas where combustible dust is present shall be equipped with electric motors and controls rated for Class II, Division 2 usage.

**21.2.2** All vacuum accessories must be static dissipative or grounded. Spark proof nozzles and hoses shall be used.

**21.2.3** All extension cords shall comply to Class II Div 2, Group F & G.

**21.2.4** The motors and switches must be rated for the atmosphere they are to be operated in.

**21.2.4.1** Mixing and blending rooms, silos and other areas that have a lot of visible airborne dust present all the time would be Class II Div 2, Group F & G.

**21.2.5** The vacuum must be constructed out of non-sparking materials that are fully grounded and bonded.

**21.2.6** The primary filter is anti-static and filters to a sub-micron level to protect the motor from dust laden air.

**21.2.7** Hoses are required to be grounded and constructed out of an anti-static material.

**21.2.8** Hose lengths cannot exceed 25' in length.

**21.2.9** The vacuum is required to have the ability to clean the filters and empty the container without creating a dust cloud.

**21.2.10** Grounding must be verified regularly by conducting a continuity test.

**21.2.10.1** End of hose to end of hose.

**21.2.10.2** Vacuum inlet to electrical ground on the cord cap.

**21.2.11** The vacuums are required to be 3<sup>rd</sup> party certified by a Nationally Recognized Testing Laboratory (NRTL) for use in the appropriate atmosphere.

## **22. Industrial Robots and Robot Systems**

Industrial robots and robot systems should be constructed in accordance with ANSI/RIA R15.06 Industrial Robots and Robot Systems.

## **22.1 Robotic Systems**

Robot systems should have Hazardous Energy lock outs. (Lockout/Tagout or Alternative Methods). See 3.3.2 of this standard for specifics.

**22.1.1** Service and maintenance functions such as sanitation and cleaning operations shall be performed in compliance with the OSHA regulation, 29 CFR 1910.147. See section 3 of this standard for specifics.

**22.1.2** Machines shall be provided with a lockout safety device on the main disconnect switch and proper signs to indicate when the machine is being cleaned or maintained. Service and maintenance functions such as sanitation and cleaning operations shall be performed in compliance with the OSHA regulation, 29 CFR 1910.147. See section 3 of this standard for specifics.

**22.1.3** Where possible, all safety interlocks should give a visual or audible indication of the condition of the interlock (locked or unlocked) before operation.

**22.1.4** Robotic systems shall be provided with an easily accessible emergency stop device in the immediate area of the operating personnel.

**22.1.5** 5/6 Axis Robots should have a DCS (Dual Check Safety) system. A risk safety analysis shall be completed during installation to ensure the installation meets regulatory requirements.

**22.1.6** When fencing is used it shall be placed to meet NFPA-79 around all sides and top to create a total safety bubble.

**22.1.7** To ensure the safety of technicians entering an enclosed safety area, a multi-step safety system is recommended (utilizing removable fobs or key) to be taken into the DCS when entering for work or programing. Systems shall meet the ISO 13849 standard and, where applicable, should be rated Cat 4-PLC.

**22.1.8** Light curtains or area sensors may be used to allow parts to enter or exit work area while keeping people from the DCS.

## **22.2 Mechanical Actions of Robotic Work Cells**

**22.2.1** All transfer points that are exposed to accidental contact shall be enclosed or guarded, as required by OSHA 29 CFR 1910 Subpart O, or a prominently displayed warning sign shall be provided at such locations where guarding is impractical. See 4.2 of the standard for specifics.

**22.2.2** The guard shall be so designed and constructed as to prevent the operator from having any part of their body in the danger zone during the operating cycle. Guarding shall be in accordance with section 4.2, 4.3 and 4.4 of this standard.

## **22.3 Collaborative robots, Co-bots or other robotic systems with no visible guarding**

**22.3.1** Safety zones shall meet R15.06 standards.

**22.3.2** Safety zones should be marked to ensure areas are kept clear while robot is activated.

**22.3.3** Guarding shall meet standards in section 4.2.

## **Appendix: Referenced and Related American National Standards**

This Appendix is not part of ANSI ASB Z50.1-2026 and is included for information purposes only.

The following standards are offered as references. The most current versions of these American National Standards that are approved by the American National Standards Institute, Inc., shall apply.

ANSI A10.18 - Safety Requirements for Temporary Roof and Floor Holes, Wall Openings, Stairways, and Other Unprotected Edges in Construction and Demolition Operations.

ANSI A14.3 - Fixed Ladders, Safety Requirements.

ANSI A1264.1 - Safety Requirements for Workplace Walking/Working Surfaces and Their Access; Workplace, Floor, Wall and Roof Openings; Stairs and Guardrail/Handrail Systems

ANSI B11.0-2023 - Safety of Machinery

ANSI B11.19-2010 - Performance Criteria for Safeguarding

ANSI S3.19-1974 - Method for Measurement of Real Ear Protection of Hearing Protectors and Physical Attenuation of Earmuffs.

ANSI Z88.2 - Practices for Respiratory Protection.

ANSI Z244.1 - The Control of Hazardous Energy – Lockout, Tagout, and Alternative Methods.

ANSI Z535.1 - Safety Colors.

ANSI Z535.2 - Environmental and Facility Safety Signs.

ANSI Z535.3 - Criteria for Safety Symbols.

ANSI Z535.4 - Product Safety Signs and Labels.

ANSI Z535.5 – Safety Tags and Barricade Tapes (For Temporary Hazards).

ANSI/ASB Z50.2 – Sanitation Standards for Bakery Equipment.

ANSI/ASME Boiler and Pressure Vessel Code - Section VIII.

ANSI/ASME B20.1 - Safety Standards for Conveyors and Related Equipment.

ANSI/ASME B30.9 - Safety Standard for Slings.

ANSI/ASME B30.16 – Overhead Underhung and Stationary Hoists.

ANSI/ASME B31.1 - Power Piping

ANSI/ASME B56.1 - Safety Standard for Low Lift and High Lift Trucks.

ANSI/ASTM F2412/F2413 Foot Protection and Performance Package

ANSI/IES RP7 - Practice for Industrial Lighting.

ANSI/NEMA ICS 6 Industrial Controls and System Enclosures

ANSI/NFPA 10 - Portable Fire Extinguishers.

ANSI/NFPA 12 - Carbon Dioxide Extinguishing Systems.

ANSI/NFPA 17 - Dry Chemical Extinguishing Systems.

ANSI/NFPA 31 - Oil Burning Equipment.

ANSI/NFPA 54 - Fuel Gas Code.

ANSI/NFPA 58 - Liquefied Petroleum Gas Code.

ANSI/NFPA 70 - National Electrical Code.

ANSI/NFPA 79 - Electrical Standard for Industrial Machinery.

ANSI/NFPA 86 - Ovens and Furnaces.

ANSI/NFPA 91 - Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids.

ANSI/NFPA 96 - Ventilation Fire Protection Commercial Cooking.

ANSI/NFPA 650 - Pneumatic Conveying Systems for Handling Combustible Particulate Solids.

ANSI/RIA R15.06 - Safety Requirements for Industrial Robots and Robot Systems.

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