

# American National Standard

for bakery equipment -  
safety requirements



American National Standards Institute  
25 West 43<sup>rd</sup> Street, New York, New York 10036



ANSI®  
ANSI/ASB Z50.1-2006 (R2016)  
Reaffirmation of  
ANSI/ASB Z50.1-2006 (R2011)

# American National Standard for Bakery Equipment - Safety Requirements



Secretariat  
American Society of Baking

Approved 2016  
American National Standards Institute, Inc.

# American National Standard

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# Forward

(This forward is not part of American National Standard Z50.1-2006 (R2016).)

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 reaffirmation of American National Standard for Bakery Equipment - Safety Requirements, ANSI Z50.1-2011. Both the original standard and present revision were 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 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, and ANSI ASB Z50.1-2011. No substantial changes were made between the ASB Z50.1-2011 and ASB Z50.1-2016 reaffirmation of the standard.

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.

Suggestions for improvement in this standard will be welcome. They should be sent to the American Society of Baking, 7809 North Chestnut Avenue, Kansas City, MO 64119. 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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Bakery Equipment Manufacturers Association  
Biscuit & Cracker Manufacturers Association

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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 Z50.2-2015.

**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, through voluntary application, 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 is not intended to be retroactive in its application to existing installations, but 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, 7809 North Chestnut Avenue, Kansas City, MO 64119, USA or [www.asbe.org](http://www.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 should 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.

**bar machine.** A machine used to form bar-shaped bakery products, basically consisting of a dough hopper, which contains a pair of feed rolls that force the dough out of the hopper through a forming die. This die contains a series of openings that cause the dough to be extruded in the form of ribbons, which are later cut into individual pieces.

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

**breaker.** A machine to reduce the size of ingredients which are in the form of slabs or bars to small pieces.

**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.

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

**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 predetermined 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**

**bolting reel.** That part of the flour handling system in which the flour is screened through a rotating drum.

**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.

**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. Note that the same person may perform operation, maintenance and/or sanitation tasks.

### 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 Lockout.** Maintenance operations shall be performed using lockout procedures in accordance with ANSI Z244.1. When this is impossible, additional measures shall be taken to assure that the maintenance operation takes place with a reasonable level of safety.

### 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 Lockout.** Sanitation and cleaning operations shall be performed using lockout procedures in accordance with ANSI Z244.1.

### 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 Mechanical Parts and Equipment

**4.2.1 Pinch and Shear Points.** All hazardous pinch, shear, or transfer points that are exposed to accidental contact shall be enclosed or guarded, or a prominently displayed warning sign

shall be provided at such locations where guarding is impractical.

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

**4.2.3 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 ANSI/ASME B15.1 - 1992 Safety Standard for Power Transmission Apparatus, and applicable ANSI/ASB Z50.2.

**4.2.4 Guards.** 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 when such guards or covers are open. All Non-product zone guards shall be fabricated in accordance with American National Standard for Power Transmission Apparatus, ANSI/ASME B15.1. All product zone guards shall be fabricated in accordance with ANSI/ASB Z50.2 requirements, with allowable openings as defined by ANSI/ASME B15.1.

**4.2.5 Handwheels.** Handwheels that rotate when the machine is in operation shall be smooth, solid disks, without protrusions.

**4.2.6 Projecting Shaft Ends.** All projecting rotating shaft ends shall have smooth beveled or rounded edges and shall not project a distance greater than one-half the shaft diameter outside the frame or housing of the machine, unless guarded by nonrotating caps or other means.

**4.2.7 Rotating Parts.** Lubrication fittings, keyways, set screws, and other projections in exposed rotating parts shall be made flush or guarded.

**4.2.8 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.

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

**4.2.10 Guard Rails.** Guard rails shall be constructed in accordance with American National Standard Safety Requirements for Floor and Wall Openings, Railings and Toeboards, ANSI A12.1.

**4.2.11 Ladders and Stairs.** Fixed ladders and stairs shall be constructed in accordance with American National Standard for Ladders - Fixed - Safety Requirements, ANSI A14.3, and American National Standard Safety Requirements for Fixed Industrial Stairs, ANSI A64.1.

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

## 4.3 Conveyors

**4.3.1 General.** Design and installation should conform to 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 within easy reach of operating personnel. The release of the lockout control 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 4.2.10.

**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. 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.

**4.3.7 Conveyor Maintenance.** Conveyor maintenance shall be performed only under lockout procedures, except where the conveyor maintenance requires the conveyor to be in motion. Conveyor lubrication shall be performed under lockout procedures, except where the conveyor is designed to be safely lubricated while in motion. Paragraph 4.2.8 shall apply.

**4.4 Electrical Parts and Equipment.** The American National Standard National Electrical Code, ANSI/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 4.2.9 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 Control Switches.** All motor disconnect control switches shall be capable of being locked in the "off" position.

**4.4.4 Electrical Components.** Electrical components shall meet requirements of ANSI/NEMA ICS2 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 is 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 leads 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 switches should be so arranged that the operation of the limit 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 4.2.10 and 4.2.11 shall apply.

**5.1.4** All stationary oscillating and vibrating sifters 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.

**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.

**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 chuted (gravity chuted 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.

**5.2.2** Bag-arm elevators with manual takeoff shall be designed to operate at a capacity not exceeding seven 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.

**5.2.3** The conveyor chain on bag-arm elevators shall travel in a suitable structure, and 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.

### 5.3 Dumpbin and Blender

**5.3.1** Openings into which bags are manually dumped shall be protected by a device that would prevent the operator from contacting moving parts in the machine.

**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 down while the dumpbin is in operation.

**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.

**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.

**5.3.5** A control device for stopping the dumpbin and blender shall be provided close to the normal location of the operator.

**5.3.6** A safety screen shall be provided in the suction nozzle over the bin or blender to prevent sacks that are being cleaned from getting into the rotor of the dust-collecting fan.

### 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 so as 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 so as 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.

## 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.

**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 4.2.11). Local codes in some areas require that ladders above a certain height shall be interrupted with a safety platform. American National Standard for Ladders - Fixed - Safety Requirements, ANSI A14.3, 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. the requirements in ANSI A14.3 shall apply.

**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.

**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 ANSI/NFPA 70, 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 ANSI/NFPA 70.

**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. Electric motors, motor controllers, and switches of pulverizing equipment, located in Class II hazardous conditions as prescribed in Article 500-5 of ANSI/NFPA 70, shall be constructed in accordance with Article 502-1 through 502-16 of the aforementioned standard.

**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 so as 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 4.2.9 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.

**6.1.5** All weighing or metering systems shall be provided with cutoff valves to prevent runaway 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** The tank sight glass shall be provided with shutoff valves.

**6.1.9** A safety device 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 the electrical parts.

**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** Jacketed tanks shall be equipped with pressure/temperature relief valves or energy cutoff devices to operate at the proper setting.

**6.3.2** Hot surfaces of tank jackets shall be insulated or guarded, or a prominently displayed sign shall be provided. Paragraph 4.2.9 shall apply.

## **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 flougate 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 his 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.

**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.

## **7.2 Vertical Batch Mixers**

**7.2.1** Paragraph 7.1.8 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, a jog switch may be provided to jog the blades for cleaning in the raised position.

## **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 covers shall be hinged or otherwise held in proximity to the openings that they cover.

**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 shut off the machine's power. The machine must then be manually restarted by the operator.

**7.4.5** Mixers that automatically start up shall have a warning sign posted.

**7.4.6** Dividers attached directly to mixers 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.

## **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.

**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.

## **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.

## 8.2 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.

**8.3 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 molder.

**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. 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

**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. Paragraph 4.2.1 shall apply.

**8.7.2** Reciprocating and traversing mechanisms shall be guarded to prevent injury between moving and stationary parts. Paragraph 4.2.1 shall apply.

**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, American National Standard for Ovens and Furnaces.

**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** Conveyorized ovens and dryers that are contained within and enclosure equipped with walk-in entrance doors shall have these doors electrically interlocked so that the conveyors will quickly stop when the door is open. 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.

**9.2 Fuel Gas Supply**

**9.2.1** Gas piping and valves serving ovens and dryers shall be installed in accordance with American National Standard National Fuel Gas Code, ANSI Z223.1.

**9.2.2** Installation of liquified petroleum gas storage and handling systems used to supply ovens and dryers shall be made

in accordance with American National Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58.

**9.3 Fuel Oil Supply.** Installation of oil storage tanks, piping, and valves serving ovens and dryers shall be in accordance with American National Standard Installation of Oil Burning Equipment, ANSI/NFPA 31.

**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 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 plant manager or the authority having jurisdiction, or both, shall prescribe the proper interval at which the equipment and safety controls shall be tested for service reliability. ANSI/NFPA 86 (See Appendices C through F and manufacturer's recommendations) and ANSI Z223-1 should be used as a guide for establishing and inspection schedule, preparing a test report form, and recording.

## **10. Loaders and Unloaders**

**10.1** All hand-fed overhead bar loaders shall be equipped with a suitable safety device to stop the loader if it is obstructed.

**10.2** Portable loaders and unloaders shall have a locking or clamping device to prevent movement during operation.

**10.3** Overhead protection shall be provided to stop the equipment immediately in case of a jam.

## **11. Depanners**

Depanners shall be designed, constructed, and installed in accordance with 4.2, 4.3.1, 4.3.4, and 4.4.

## **12. Frying Equipment**

**12.1 Automatic Frying Machine.** The automatic frying machine may be used to automatically fry donuts, pies, and honey buns and is generally equipped with feed devices, exhausters, and ducts.

### **12.1.1 Design and construction**

**12.1.1.1** All frying machines shall be either insulated or properly guarded at necessary locations to prevent burns to persons.

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

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

**12.1.1.4** The machine shall be equipped with a device that will prevent excessive frying medium temperatures in case of thermostat failure. 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.

**12.1.1.5** The machine shall be equipped with a safety device to prevent igniting of the frying fat owing to insufficient fat coverage of heating tubes or elements.

**12.1.1.6** 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.

**12.1.1.7** 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.

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

**12.2 Installation.** Gas piping and valves serving fryers shall be installed in accordance with ANSI Z223.1.

**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.

**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.

#### **12.2.4 Operation**

**12.2.4.1** 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.

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

#### **12.2.5 Maintenance**

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

**12.2.5.2** 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 cleaned of dirt and dust, and adjusted for proper operation.

**12.3 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.

#### **12.3.1 Nonpressure-Type Systems**

**12.3.1.1** 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.

**12.3.1.2** 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.

**12.3.2 Pressure-Type Systems.** Paragraphs 12.3.1.1 and 12.3.1.2 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.

### **12.4 Open Frying Kettles**

**12.4.1** 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 11.1 shall apply.

**12.4.2** 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.

### **12.5 Fat Filters**

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

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

**12.5.3** 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.

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

**12.5.5** Hoses on filters shall be of such quality that they will not break down during normal operations, even when hose clamps are the mode of shutoff.

**12.5.6** Hand protection shall be provided 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 an enclosure is used, all door latches shall be operable from 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.

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

**14.2.3** 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.

## **14.3 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 4.2.

**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.

## **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** Continuously operating machines shall be provided with an easily accessible emergency stop button in the immediate area of the operating personnel.

**15.1.5** Machines shall be designed to prevent overspray from hitting the operator.

**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.

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

**15.2.4** 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.

**15.2.5** Exterior loading ramps to rack washers should not be used.

## **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**

### **17.1 Slicing and Wafer Cutters**

**17.1.1** All bread slicing machines shall be provided with a mechanical device to 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 quickly 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 fast 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.

### **17.2 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 plate or guard, or otherwise arranged to keep workers from getting into the hazard areas.

**17.2.2** 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.

**17.2.3** 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.

## **18. Packaging Equipment.**

### **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 convenient, easily reached 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, or a prominently displayed warning sign shall be provided.

**18.2.2** 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, 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 convenient, easily reached 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 convenient, easily reached 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 convenient, easily reached 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 dispersement 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 a hinged hood guard to cover the knives. These guards shall be electrically interlocked to stop the machine if they are removed.

**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 infeed 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.

**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. Freezers**

**20.1** Insulated enclosures or housing for walk-in freezers shall have an exit door which shall be operable from inside and outside. If the enclosure is larger than 800 ft<sup>2</sup> (74.3 m<sup>2</sup>) in floor area, two exit doors shall be provided, remote from each other.

**20.2** A key-operated start switch for operation of a freezer conveyor or mechanical mechanism shall be provided inside freezer enclosures for use by qualified maintenance and sanitation personnel. Emergency stop buttons shall be provided, together with the key-operated start switch.

**20.3** A respirator for ammonia shall be provided and stored in a convenient location outside the freezer enclosure for freezers using ammonia as a refrigerant.

**20.4** Cryogenic-type freezers shall be guarded so as to prevent personnel from accidentally coming into contact with the refrigerant or extremely cold surfaces.

**20.5** Protective clothing shall be made available to personnel entering low-temperature freezers.

**20.6** A prominently displayed warning sign shall be posted outside a walk-in freezer requiring the use of protective clothing.

## **21. Miscellaneous equipment**

### **21.1 Steam and Pressure Cleaners**

**21.1.1** Steam and pressure cleaners shall comply with applicable sections of the ANSI/ASME Boiler and Pressure Vessel Code, Section VIII.

**21.1.2** Steam and water cleaners heated by gaseous fuel or fuel oil shall have their combustion or firing equipment approved by Underwriters Laboratories. Electric heated units shall be protected by thermostats.

**21.1.3** Steam hoses shall be attached to cleaners with safety interlocking couplings.

**21.2 Portable Vacuum Cleaners.** Vacuum cleaners used in dusty areas where flour, starch or sugar dust is present shall be equipped with electric motors and controls designed for Class II,

Division 2 usage, or the power unit shall be located outside of the dusty area. The vacuum cleaner shall be of the bypass motor design. Sparkproof nozzles and hoses shall be used.

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

This Appendix is not part of ANSI Z50.1 - 2016 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 - Temporary Floor and Wall Openings, Flat Roofs, Stairs, Railings and Toeboards, Construction Safety Requirements

ANSI A14.3,- Fixed Ladders, Safety Requirements for

ANSI A1264.1 - Safety Requirements for Floor and Wall Openings and (nonresidential) Stair and Railing

ANSI/ASME B30.16 - Overhead Hoists (Underhung).

ANSI/ASME MH1.2.2M - Pallet Sizes

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

ANSI Z535.1 - Safety Color Code.

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 - Accident Prevention Tags

ANSI Z41 - Personal Protection - Protective Footwear

ANSI Z63.13 - Gas Food Service Equipment - Deep Fat Fryers

ANSI Z88.2 - Practices for Respiratory Protection

ANSI Z223.1, Fuel Gas Code

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

ANSI Z244.1 - Personnel Protection, Lockout/Tagout of Energy Sources - Minimum Safety Requirements

ANSI/ASME B15.1 - Safety Standard for Mechanical Power Transmission Apparatus.

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

ANSI/ASME B30.9 - Safety Standard for Slings

ANSI/ASME B31.1 - Power Piping

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ANSI/IES RP7 - Practice for Industrial Lighting

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 58 - Standard for the Storage and Handling of Liquefied Petroleum Gases.

ANSI/NFPA 70 - National Electrical Code.

ANSI.NFPA 86 - Ovens and Furnaces.

ANSI/NFPA 91 - Exhaust Systems for Air Conveying of Materials.

ANSI/NFPA 96 - Vapor Removal from Cooking Equipment.

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

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

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