ANSI/SPI B151.28-1995

American National Standard

for Plastics Machinery–

Machines to Cut, Slit, or Buff Plastic Foams– Safety Requirements for the Manufacture, Care, and Use

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American National Standard
for Plastics Machinery–

Machines to Cut, Slit, or Buff Plastic Foams– Safety Requirements for the Manufacture, Care, and Use

Sponsor

Society of the Plastics Industry

Approved April 14, 1995

American National Standards Institute, Inc.

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Contents

Page

Foreword iii

1 Scope, purpose, and application 1

2 Normative references 2

3 Definitions 2

4 Specific cutting machines covered 5

5 Construction, reconstruction, and modification 22

6 Responsibility of others 23

Figures

1 Horizontal cutting machine 25

2 Carousel 27

3 Automatic profile cutter 28

4 Cut-off machine 29

5 Vertical saw (Vertical cutting machine) 30

6 Convoluter, compression cutter, and roll stock splitter 31

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Foreword (This foreword is not part of American National Standard ANSI/SPI B151.28-1995.)

The project on Safety Requirements for the Manufacture, Care, and Use of Machines to Cut, Slit, or Buff Plastic Foams was initiated under the auspices of the Polyurethane Foam Association and the Safety Committee of the Machinery Division of the Society of the Plastics Industry, Inc. (SPI).

The established woodworking standards for saws do not apply in the Plastic Foam industry because of the size of the foam material being processed. Large exposed blade areas are required and the blade speeds are typically much lower. These differences and differences in production requirements necessitate a separate standard.

A standard treating the manufacture, care, and use of machines to cut, slit, or buff plastic foams is complicated by the variety and sizes of machines manufactured and in use, the virtually infinite combinations of production methods used, and the operating conditions existing in the industry today.

The primary objective of the standard is to minimize hazards associated with machine activity by establishing requirements for the manufacture, care, and the use of these machines.

To assist in the implementation of these requirements, responsibilities have been assigned to the original manufacturer, the remanufacturer, the modifier, the employer, and the operator.

This standard incorporates the corrections that were listed in the supplement to this standard, ANSI/SPI B151.28a-1995, which was approved by ANSI on December 1, 1995. The corrections provided updates to cross-references in clause 5. The supplement will not be published as a separate document.

Recognizing the impossibility of updating equipment and changing operating methods allied with existing machines immediately after the approval of this standard, a two-year period has been allowed to employers for modifying existing machines. Within one year after the date of approval of this standard, all new work of manufacturers, remanufacturers, and modifiers must conform to this specification.

Suggestions for improvement of this Standard will be welcome. They should be sent to the Society of the Plastics Industry, 1275 K Street, NW, #400, Washington, DC 20005 or to the Polyurethane Foam Association, PO Box 1459, Wayne, NJ 07474-1459.

Consensus for this standard was achieved by use of the Canvass Method.

The following organizations recognized as having and interest in the standardization of machines to cut, slit, or buff plastic foams were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

Aerospace Industries Association
Alliance of American Insurers
American Automobile Manufacturers Association
American Insurers Safety Group
American Standards Testing Bureau
Factory Mutual Research

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Industrial Safety Equipment Association
Masonry and Concrete Saw Manufacturers Association
National Institute of Standards and Technology
Polyurethane Foam Association
Robotic Industries Association
Rubber Manufacturers
Society of the Plastic Industry
  Machinery Manufacturers Division
  Molders Division
  Polyurethane Division

The ad hoc Safety Standard Committee, which was responsible for the development of this standard, had the following members:

Dario J. Ramazzotti, Chairman
(Edge-Sweets Company)

David Finley
(Fecken-Kirfel America, Inc.)
Neal Frampton
(Ferry Industries (Femco))
Al Thoma
(Baumer of America, Inc.)
Gale Vosberg
(Ferry Industries (Femco))

Explanation of Standard Format

American National Standard ANSI/SPI B151.28-1995 uses a two-column format to provide both specific requirements and supporting information.

The left column, designated “Standard Requirements,” is confined solely to these requirements and is printed in bold type.

The right column, designated “Explanatory Information,” contains only information that is intended to clarify the standard. This column is not part of the standard. Where supplementary photographs or sketches are required, they are designated as “Illustrations.”

Operating rules (safe practices) are not included in either column unless they are of such a nature as to be vital safety requirements that are equal in weight to other requirements, or unless they are guides to assist in compliance with the standard.

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American National Standard
for Plastics Machinery –

Machines to Cut, Slit, or Buff Plastic Foams – Safety Requirements for the Manufacture, Care, and Use

STANDARD REQUIREMENTS

EXPLANATORY INFORMATION

(Not part of *American National Standard for Plastics machinery – Machines to cut, slit, or buff plastic foams – Safety requirements for the manufacture, care, and use*, ANSI/SPI B151.28-1995)

1 Scope, purpose, and application

1.1 Scope

This standard applies to the general class of sawing, cutting, slitting, and buffing machines that are designed specifically to fabricate plastic foams from rough blocks to commercially required shapes and forms. These machines are typified by blade or wheel contact against the material to cause the material to change shape.

E1.1 Scope

This standard does not apply to laser, hot wire, or water jet cutting nor does it apply to machines designed to cut rigid materials, such as wood or steel.

1.2 Purpose

The purpose of this standard is to establish safety requirements for the construction, care, and use of sawing, cutting, slitting and buffing machines for cellular plastic.

E1.2 Purpose

Cellular plastic is commonly referred to as *plastic foam* or simply *foam*.

1.3 Applications

1.3.1 New, modified, or remanufactured machines for cutting foams

The requirements of this standard shall apply to all new, modified, or remanufactured foam slitting, sawing, cutting, and buffing machines *manufactured, modified, or remanufactured for installation* in the United States twelve (12) months after approval of this standard (i.e., beginning April 1996).

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1.3.2 Existing machines for slitting, sawing, cutting, and buffing foams

All existing machines shall be made to conform to the requirements of this standard within 24 months after approval of this standard (April 1997).

An employer shall not operate a machine or permit it to be operated unless it is in compliance with this standard after that time.

E1.3.2 Existing machines for slitting, sawing, cutting, and buffing foams

Inquiries with respect to the application of, or substantive requirements of this standard should be addressed to the Society of the Plastics Industry or to the Polyurethane Foam Association.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this American National Standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI Z535.1-1991, *Safety color code*

ANSI Z535.2-1991, *Environmental and facility safety signs*

ANSI Z535.3-1991, *Criteria for safety symbols*

ANSI Z535.4-1991, *Product safety signs and labels*

ANSI Z535.5-1991, *Accident prevention tags*

ANSI/NFPA 79-1994, *Electrical Standard for Industrial Machinery*

3 Definitions

Because the various types of materials processed on this equipment cover such a wide range of technologies, we refer to the processes in the four following generic terms:

a) *Cutting:* Severing into parts with a sharp edged blade.

b) *Slitting:* Cutting without removal of any material by the blade. Commonly used in dividing flexible materials using a bandknife or a blade without a set in the teeth.

c) *Sawing:* Cutting by means of material removal by the blade teeth. Commonly

E3 Definitions

In this standard, the terms *cutting*, *sawing*, and *slitting* are used interchangeably, since the machine and its related safety are basically the same.

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used on rigid material using a blade with set teeth.

d) *Buffing:* Shaping by means of *abrading* material from the foam.

3.1 awareness devices: A red safety light prominently displayed on the machine to indicate power is "on" the blade drive motor.

3.2 blade breakage detector: A sensor that detects breakage of the blade and is interlocked to stop the blade drive motor.

E3.2 blade breakage detector: One version of this is a limit switch fixed to the take-up wheel mounting, which moves when the blade breaks and trips the switch, stopping the motor.

3.3 danger zone warning: Safety marking on the floor or moveable stanchion that can be used to warn of hazardous areas.

3.4 emergency stop function: Once an emergency stop has been initiated, manual reset shall be used.

3.5 employer: Any entity responsible for the use, care, and operation of machinery and that hires, or is responsible for, the personnel associated with the machine operation.

3.6 fully automatic operation: The case in which operators are not required to perform manual functions once the process has been started.

3.7 guard, barrier: A physical means of separating personnel from areas of danger. These guards are not interlocked with the electrical controls.

3.8 guard, fixed: A barrier guard that requires the use of hand tools or key in order to remove or open.

3.9 guard, perimeter: A fence or fixed guard that requires a hand tool or key to open or remove. This guard is placed around the entire danger area.

3.10 manual operation: A machine function in which operators are required to perform manual tasks as part of the normal production process.

3.11 manufacturer: Any company whose business is the manufacture of new machines for installation in the United States.

E3.11 manufacturer: This term includes those who manufacture or reconstruct machines for their own use.

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3.12 modifier: Any company that changes the machine such that it no longer meets the original equipment manufacturer specifications.

E3.12 modifier: If an existing operation is modified by the employer, it is the intent of this standard to point out to the employer that it is his/her responsibility to provide adequate safety.

3.13 operator: An individual who performs production work on the machine.

3.14 point of operation: The usable area on a machine where cutting, shaping, or forming can be performed upon the material.

3.15 presence-sensing device: A device designed to create a sensing field at a dangerous area that sends a signal to stop hazardous motion of the machine if the field is penetrated.

Some typical forms of presence-sensing devices are described in 3.15.1 through 3.15.3.

3.15.1 safety cable or drop bar: A form of presence-sensing device is stretched across the danger area to stop hazardous motion. When tripped, switch shall require manual reset.

E3.15.1 safety cable or drop bar: Differs from an *emergency stop function* (3.4) since this stops the motion and does not disrupt power to the machine. In this way, memory registers and counters are maintained.

3.15.2 safety mat: A form of presence-sensing device positioned on the floor at the hazardous area of the machine. When a person steps on the mat, machine motions shall stop. Manual reset shall be required.

3.15.3 light screen devices: A form of presence-sensing device creating a light beam or series of beams across a hazardous area. Penetration of this light-beam screen stops all machine motion. Manual reset shall be required.

3.16 remanufacturer: Any company whose business is the redesign and/or major reconstruction of machines for installation in the United States.

3.17 shall: Denotes a mandatory requirement.

3.18 should or may: Denotes a recommendation.

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4 Specific cutting machines covered

4.1 Horizontal cutting machine with manual or automatic table

4.1.1 Purpose of machine

Horizontal cutting machines are designed to slit foams into thin layers or wedges.

4.1.2 Description of typical machine

A stationary cutting unit with a toothed blade or a sharpened bandknife blade running on two- or four-blade wheels and a manually pushed or automatic powered table. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently. The entire table or a portion of it may tilt along the axis of motion.

4.1.3 Operation of machine

The table is loaded with one or more foam buns. Layer thickness may be set manually or on an automatic index. The blade is started and the table is moved toward the blade, running the blade through the bun. The table is then moved back to its starting position. The head would index down and this cycle would be repeated until the entire bun is cut. When cutting wedges, the table is tilted to effect an angled cut.

4.1.4 Danger points

a) Moving sharp blade;

b) Grinder;

c) Moving table.

4.1.5 Safeguarding of danger points

4.1.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.1.5.2 A blade breakage detector (3.2) shall be supplied.

4.1.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

E4.1.5.3 Figures 1(a) and 1(b) identify typical locations of warning signs. This can vary depending on design.

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4.1.5.4 The operator control panel shall be equipped with an emergency stop button.

4.1.5.5 The cutting unit shall have a barrier guard (3.7) to prevent the operator from getting into the sides of the machine on the feed or front end. See figures 1(a) and 1(b).

4.1.5.6 The grinder shall be totally enclosed with barrier guards (3.7).

4.1.5.7 On manually pushed tables, a barrier guard mounted to the table shall be supplied to prevent the operator from reaching the blade from the normal push position. See figure 1(a).

4.1.5.8 Powered tables shall have a danger zone warning (3.3) at both ends of the table travel. See figure 1(b).

4.1.5.9 The table on manual machines shall be able to be locked in position for loading.

E4.1.5.9 The table lock prevents the table from moving forward if the foam material is pushed onto the table.

4.2 Carousels

4.2.1 Purpose of machine

Carousel automatic circular cutting machines are designed to slit foams into thin layers in a continuous motion. There are two types: rotating head and rotating table.

4.2.2 Description of typical machine

4.2.2.1 Rotating-head carousel

A rotating-head carousel automatic circular cutting machine is a rotating cutting unit equipped with a stationary round table, with or without a vacuum to hold the foam buns in position and a toothed blade or a sharpened bandknife running over four-blade wheels. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently.

4.2.2.2 Rotating-table carousel

A rotating-table carousel automatic circular cutting machine utilizes a stationary cutting unit and a rotating table.

4.2.3 Operation of machine

The table is loaded with foam buns and the machine is set to the required layer thickness. The bandknife is turned on and the cutting unit or the table rotates at a variable speed. After each revolution, the cutting

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unit automatically lowers to the preselected layer thickness. This operation continues until the entire foam bun is cut. The finished sheets are then unloaded.

4.2.4 Danger points

a) Moving sharp blade;

b) Rotating cutting head;

c) Rotating table;

d) Grinder.

4.2.5 Safeguarding of danger points

4.2.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.2.5.2 A blade breakage detector (3.2) shall be supplied.

4.2.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.2.5.4 The operator control panel shall be equipped with an emergency stop button.

4.2.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.2.5.6 During loading and unloading of the product, a blade barrier guard shall cover the knife at the point of operation (3.14). See figure 2.

4.2.5.7 The rotating table or head shall be encircled with a danger zone warning (3.3). See figure 2.

4.2.5.8 A barrier guard (3.7) shall be used that will keep the user from getting into the sides of the machine on the front or feed end. See figure 2.

4.3 Automatic profile cutting machine (contour cutters)

4.3.1 Purpose of machine

Automatic profile cutting machines (contour cutters) are designed to make contoured-, horizontal-, and vertical-shaped parts from blocks of flexible polyurethane foams and similar materials automatically.

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4.3.2 Description of typical machine

There are basically three cutting tool principles: a continuous bandknife, a continuous cutting wire, and a reciprocating blade, all of which are computer controlled. The movable cutting units house the blade wheels and the blade or cutting wire.

4.3.3 Operation of machine

After the table or conveyor is loaded with the foam, the machine automatically follows the programmed contours until the entire foam bun is cut into the desired shape.

4.3.4. Danger points

a) Moving bandknife/wire/reciprocating blade;

b) Grinder;

c) Movable cutting unit;

d) Moving table or belt.

4.3.5 Safeguarding of danger points

4.3.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.3.5.2 A blade breakage detector (3.2) shall be supplied. A reciprocating knife does not require a blade breakage detector.

4.3.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.3.5.4 The operator control panel shall be equipped with an emergency stop button.

4.3.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.3.5.6 The perimeter of the machine shall be protected by a danger zone warning (3.3). See figure 3.

4.4 Tracing profile cutting machine (manual)

4.4.1 Purpose of machine

Manual tracing profile cutting machines are designed to cut shapes from foams with a round blade (wire) manually following a template.

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4.4.2 Description of typical machine

A four-wheeled cutting head mounted on pivot with a continuous round blade (wire) and a manually positioned table.

4.4.3 Operation of machine

The table is loaded with a foam bun. A template is mounted on the tracing panel. The table is positioned to locate the template within the bun. The blade is started and manually guided around the template. The sequence is repeated until the bun is completely processed.

4.4.4 Danger points

a) Moving round blade.

4.4.5 Safeguarding of danger points

4.4.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.4.5.2 A blade breakage detector (3.2) shall be supplied.

4.4.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.4.5.4 The operator control panel shall be equipped with an emergency stop button.

4.5 Vertical cut-off cutting machine (guillotine)

4.5.1 Purpose of machine

Vertical cut-off (guillotine) cutting machines are designed to cut down through a bun of foam. There are two types of machines: stationary and traveling.

4.5.2 Description of machine

4.5.2.1 Stationary cutting machine

A stationary cutting machine is a stationary cutting unit with a toothed or sharpened bandknife blade. This machine can utilize a reciprocating blade or a continuous blade running on two or more blade wheels. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently.

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4.5.2.2 Traveling cutting machine

A traveling cutting machine is a carriage-mounted cutting unit designed to travel with the foam during the cut.

4.5.3 Operation of machines

4.5.3.1 Stationary cutting machine

In the stationary version, the foam bun enters the saw area on a conveyor and is positioned under the saw. The blade is started and the cutting head moves down, running the blade through the foam bun. The cutting head then returns to the "up" position to complete the cycle. The bun is then carried away by the conveyor.

4.5.3.2 Traveling cutting machine

In the traveling version, the head is synchronized and travels at same speed as the foam during the cut.

4.5.4 Danger points

a) Moving sharp blade;

b) Grinder;

c) Moving head carriage on traveling version;

d) Down motion of head on both stationary and traveling versions.

4.5.5 Safeguarding of danger points

4.5.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.5.5.2 A blade breakage detector (3.2) shall be supplied. The reciprocating knife does not require a blade breakage detector.

4.5.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.5.5.4 The operator control panel shall be equipped with an emergency stop button.

4.5.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.5.5.6 Perimeter guards (3.9) shall envelop head movement area on either traveling or stationary cut off. See figure 4.

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4.6 Cross-cut cut-off cutting machine

4.6.1 Purpose of machine

Cross-cut cut-off machines are designed to cut across a bun of foam for the purpose of reducing the bun length. This unit can be constructed in two modes: stationary and traveling.

4.6.2 Description of machine

4.6.2.1 Stationary mode

A stationary cross-cut cut-off cutting machine has a cutting head that consists of a toothed or continuously or intermittently sharpened bandknife blade running over two or more wheels. This machine may also utilize reciprocating or oscillating blades. This cutting head travels across the bun.

4.6.2.2 Traveling mode

The traveling mode is used in situations where the buns are cut to length while moving continuously.

4.6.3 Operation of machine

4.6.3.1 Stationary mode

The foam enters the cutting machine on a conveyor and comes to a complete stop at the position where a cut is required. The cutting machine then traverses across the bun and stops. The foam is then conveyed away.

4.6.3.2 Traveling mode

The foam bun enters the cutting machine on a conveyor. When a preset length has passed the cutting head, the cutting unit engages with the conveyor as the cutting head starts across the bun line, running the blade through the bun. When the cutting head exits the bun, at the opposite side, the cutting unit is disengaged from the conveyor. The cutting unit then returns to its home position, to start the next cycle.

4.6.4 Danger points

a) Moving sharp blade;

b) Moving head carriage on traveling version;

c) Moving head across the conveyor;

d) Grinders.

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4.6.5 Safeguarding of danger points

4.6.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.6.5.2 A blade breakage detector (3.2) shall be supplied. The reciprocating knife does not require a blade breakage detector.

4.6.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.6.5.4 The operator control panel shall be equipped with an emergency stop button.

4.6.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.6.5.6 Perimeter guards (3.9) shall envelop the carriage travel area on traveling version (see figure 4). The guards shall envelop head movement outside of the cutting area on either traveling or stationary types.

4.7 Vertical cutting machine

4.7.1 Purpose of machine

Vertical cutting machines are designed to cut buns of foam by trimming the sides, cutting buns into smaller blocks, or both.

4.7.2 Description of machine

A vertical cutting machine has a cutting head consisting of a vertical blade running over two or more blade wheels. The blade can be of various styles of cutting edge, a toothed blade or bandknife, which can be sharpened continuously or intermittently by a grinder system. There are two basic types of vertical cutting machines: a machine with a fixed cutting head and a movable manual or powered table or a machine with a fixed table and an automatic powered reciprocating cutting head.

4.7.3 Operation of machine

4.7.3.1 Fixed cutting head and a movable manual or powered table

The foam to be cut is loaded on the table and, with the assistance of the side fence(s), the foam is positioned before each cut. The table reciprocates to pass the material into the blade. Cutting can be in one direction or two.

E4.7.1 Purpose of machine

Because of the large height of cut capability on these saws, they are not intended to be used for manual pattern cutting.

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4.7.3.2 Fixed table and automatic powered reciprocating cutting head

The foam to be cut is loaded on the table and in automatic operation, the foam is automatically positioned by the side fence(s) before each cut. The head automatically reciprocates passing the blade through the material. Cutting can be in one direction or two.

4.7.4 Danger points

a) Moving sharp blade and blade wheels;

b) Powered moving table;

c) Powered moving cutting head;

d) Grinder.

4.7.5 Safeguarding of danger points

4.7.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.7.5.2 A blade breakage detector (3.2) shall be supplied.

4.7.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.7.5.4 The operator control panel shall be equipped with an emergency stop button.

4.7.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.7.5.6 The area around the powered moving head shall be protected by perimeter guards (3.9) or presence-sensing devices (3.15) (see figure 5).

4.7.5.7 An adjustable blade guide barrier guard (3.7) shall be supplied and shall always be lowered as close to the top of the material being cut as possible to minimize the amount of exposed blade.

E.4.7.5.7 The operator has the responsibility to set the guard height.

4.7.5.8 A see-through barrier guard (3.7) to separate the operator from the point of operation shall be supplied (see figure 5). On powered moving head machines, the barrier shall be at both ends of the table.

4.7.5.9 On manual push tables, a locking device shall be supplied to lock the table in the unloading/loading position.

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4.8 Tilting vertical cutting machine

4.8.1 Purpose of machine

Tilting vertical cutting machines are designed to cut various angles in foam.

4.8.2 Description of typical machine

Tilt cutting machines are similar to conventional fixed head-moving table vertical cutting machines, except that the cutting head or table is adjustable in angle left or right from the vertical position.

4.8.3 Operation of machine

The tilting can be done manually or with powered adjustment. Functionally, the machine operates similarly to the one described in 4.7.3.1.

4.8.4 Danger points

The danger points and safeguarding of the danger points are the same as the conventional vertical cutting machine (4.7).

4.9 Pattern-cutting machine

4.9.1 Purpose of machine

Pattern cutting machines are designed to cut irregular shapes in foam.

4.9.2 Description of typical machine

A pattern-cutting machine consists of a vertical blade cutting head, and a horizontal table. Both the cutting head and the table remain in a fixed position.

4.9.3 Operation of machine

The material is manually moved by the operator to guide the cut in the desired direction or shape.

4.9.4 Danger Points

Due to the type of work to be performed, the operator's hands can be in close proximity to the blade.

4.9.5 Safeguarding of danger points

4.9.5.1 All guarding and safety items are the same as found on a conventional vertical cutting machine (4.7), except for the point of operation. The barrier guard described in 4.7.5.8 cannot be used.

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4.9.5.2 Chain mail, metal mesh gloves, or other hand protection may be used to protect the operator when using a knife edge blade only. Do not use these gloves with a tooth blade since it can create a dangerous situation.

4.10 Trim cutting machine–vertical

4.10.1 Purpose of machine

Vertical trim cutting machines are designed to trim the sides of a bun or to divide the bun into smaller sections vertically, or to do both.

4.10.2 Description of a typical machine

These machines may consist of one or more cutting heads or a multiple blade head. The blades may be the traditional band blade or vibrating or reciprocating blades. The machine may also contain grinding units to sharpen the bandknife continuously or intermittently.

4.10.3 Operation of machine

The head or heads are set in the desired location and then a conveyor carries the bun into the blade. The trim cutting machine is usually part of a line of cutting machines processing a quantity of buns in an automatic or semi-automatic fashion.

4.10.4 Danger points

a) Blade and blade drive mechanisms;

b) Grinder;

c) Power-positioned cutting head.

4.10.5 Safeguarding of danger points

4.10.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.10.5.2 A blade breakage detector (3.2) shall be supplied.

4.10.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.10.5.4 The operator control panel shall be equipped with an emergency stop button.

4.10.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.10.5.6 The head-positioning mechanism shall be protected by a barrier guard.

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4.11 Loop splitter

4.11.1 Purpose of machine

The loop splitters are designed to cut a continuous sheet horizontally at high speed from a long foam block. A wind-up is used to facilitate handling of the cut sheet.

4.11.2 Description of typical machine

A frame consisting of a continuous loop of driven conveyors is opened at one or both ends. The long block is then driven into the loop frame. The entrance points, or towers, can then be closed. The long block is driven around the loop at variable speeds through a horizontal cutting head.

4.11.3 Operation of machine

A stationary horizontal cutting head, using a continuously sharpened blade, cuts an endless sheet of predetermined thickness from the surface. The cut sheet is fed to a wind-up mechanism located directly behind the cutting head. Once wound to the predetermined length, the roll may be cut by a circular cross cutter and then be removed.

4.11.4 Danger points

a) Moving sharp blade;

b) Grinder;

c) Moving conveyor;

d) Moving tower;

e) Cross cutter blade.

4.11.5 Safeguarding of danger points

4.11.5.1 Both towers shall be enclosed by a perimeter guard.

4.11.5.2 The cutting head, cut-off saw, and trimming machine shall be enclosed by a perimeter guard.

4.11.5.3 The grinder shall be totally enclosed with barrier guards (3.7).

4.11.5.4 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.11.5.5 A blade breakage detector (3.2) shall be supplied.

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4.11.5.6 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.11.5.7 The operator control panel shall be equipped with an emergency stop button.

4.12 Boring equipment

4.12.1 Purpose of machine

Boring equipment is designed to drill central holes into square or cylindrical foam blocks for peeling (4.13).

4.12.2 Description of typical machine

This machine consists of a cradle to support the foam and a boring bar.

4.12.3 Operation of machine

The cradle unit or the boring head is pulled along the guide rails, the cutting tube drills through the center of the block.

4.12.4 Danger points

a) Sharpened boring tube.

4.12.5 Safeguarding of danger points

4.12.5.1 The cutting machinery shall have awareness devices (3.1) and safety signs (5.3).

4.12.5.2 Operator control panel shall be equipped with a red mushroom emergency stop button.

4.13 Peeler

4.13.1 Purpose of machine

Peelers are designed to peel continuous sheets, of a preselected thickness, from a cylindrical or square-shaped foam block.

4.13.2 Description of typical machine

The foam block is held in place by a shaft that is inserted through the center. The block is rotated as it is being cut. The machine may also contain grinding units to sharpen the bandknife continuously or intermittently.

4.13.3 Operation of machine

A driven pressure roller may be used to feed the material into a continuously or intermittently sharpened bandknife. The cut sheet is then pulled onto a spool and wound.

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4.13.4 Danger points

a) Moving sharp blade and blade wheels;

b) Grinder;

c) Pressure feed roller nip point.

4.13.5 Safeguarding of danger points

4.13.5.1 The grinder shall be totally enclosed with barrier guards (3.7).

4.13.5.2 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.13.5.3 A blade breakage detector (3.2) shall be supplied.

4.13.5.4 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.13.5.5 Operator control panel shall be equipped with an emergency stop button.

4.13.5.6 A presence-sensing device (3.15) shall be used in the front and rear of the machine.

4.14 Convoluter or roll stock splitter

4.14.1 Purpose of machine

Convoluters or roll stock splitters are designed to cut convolutions in foam sheet.

4.14.2 Description of typical machine

Two rollers (profiled or flat) are positioned above and below a continuously moving blade, running on two blade wheels. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently.

4.14.3 Operation of machine

A foam sheet is placed on an entrance table and manually fed between the upper and lower draw-in rollers. When the foam sheet has been engaged, the rollers maintain a continuous feed. The draw-in speed and the gap between the upper and lower rollers is variable. As the foam is being deformed, it is split by a bandknife. The split sheet exits the cutting area and the convoluted halves may then be separated.

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4.14.4 Danger points

a) Draw-in rollers;

b) Blade and blade wheels;

c) Grinder.

4.14.5 Safeguarding of danger points

4.14.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.14.5.2 A blade breakage detector (3.2) shall be supplied.

4.14.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.15.5.4 The operator control panel shall be equipped with an emergency stop button.

4.15.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.14.5.6 A safety cable (3.15.1) or a safety drop bar shall be used at the front and rear of the machine (see figure 6).

4.14.5.7 Barrier guards (3.7) shall prevent side access to the blade (see figure 6).

4.15 Radius cutter

4.15.1 Purpose of machine

Radius cutters are designed to cut a radius on the edge of a foam block.

4.15.2 Description of typical machine

An oscillating or continuous bandknife with a radial guide is mounted to a cutting table. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently.

4.15.3 Operation of machine

The foam block is manually or automatically fed into the cutting form resulting in a radius cut along the outer edge.

4.15.4 Danger points

a) Sharp blade;

b) Grinder.

4.15.5 Safeguarding of danger points

4.15.5.1 The grinder shall be totally enclosed with barrier guards (3.7).

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4.15.5.2 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.15.5.3 A blade breakage detector (3.2) shall be supplied. A reciprocating knife does not require a blade breakage detector.

4.15.5.4 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.16 Buffing machine (manual and automatic)

4.16.1 Purpose of machine

Manual and automatic buffing machines are designed to produce round, flat, oval, and rectangular foam shapes out of square or rectangular foam blocks.

4.16.2 Description of typical machine

The block is fixed on a pin receiver and manually fed into a spinning router or buffing head, or the foam can be manually drawn across a spinning buffing head.

4.16.3 Operation of machine

4.16.3.1 Manual version

The feeding and buffing is a continuous operation. The finished part is removed manually.

4.16.3.2 Fully automatic version

Same as above but uses an automatic feed magazine and a pneumatic finished block discharge.

4.16.4 Danger points

a) Spinning milling cutter or router;

b) Feed mechanism.

4.16.5 Safeguarding of danger points

4.16.5.1 The cutting machinery shall have awareness devices including a red light indicating power is on the blade drive, danger signs, and warning signs.

4.16.5.2 An operator control panel shall be equipped with a red mushroom emergency stop button.

4.16.5.3 Barrier guards (3.7) shall be supplied to prevent access to the point of operation from the operator station.

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4.17 Compression cutter

4.17.1 Purpose of machine

This profiling machine uses a template and compression to form parts that require different depth, level, and shape.

4.17.2 Description of typical machine

Rollers or conveyor are positioned above and below a continuously moving blade, running on two blade wheels. The machine can also contain grinding units to sharpen the bandknife continuously or intermittently.

4.17.3 Operation of machine

A cut-out template is placed in the recessed fixture of the table surface. A foam sheet is then positioned over the template. The fixture table is mechanically pulled under a set of pressure rollers or conveyor that depress the foam through the cut-outs in the template. At the same time, the depressed foam that extends below the template is removed by a continuously or intermittently sharpened, endless type bandknife.

4.17.4 Danger points

a) Sharp blade and blade wheels;

b) Grinder;

c) Draw-in rollers or conveyor.

4.17.5 Safeguarding of danger points

4.17.5.1 The blade and blade wheels shall be totally enclosed with barrier guards (3.7), except at the point of operation (3.14).

4.17.5.2 A blade breakage detector (3.2) shall be supplied.

4.17.5.3 The cutting machine shall have awareness devices (3.1) and safety signs (5.3).

4.17.5.4 The operator control panel shall be equipped with an emergency stop button.

4.17.5.5 The grinder shall be totally enclosed with barrier guards (3.7).

4.17.5.6 A safety cable (3.14.1) or a safety drop bar shall be used to the front and rear of the machine (see figure 6).

4.17.5.7 Barrier guards shall prevent side access to the blade (see figure 6).

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5 Construction, reconstruction, and modification

5.1 Manufacturers

5.1.1 Installation

It shall be the responsibility of cutting machine manufacturers who design, construct, or design and construct machines for installation within the United States to do so in accordance with this standard within 12 months of its adoption.

E5.1.1 Installation

This also applies to foreign manufacturers who ship machines to the United States.

5.1.2 Instructions

It shall be the responsibility of the manufacturer to furnish written instructions with the machinery that establishes guidelines for operation and preventative maintenance.

5.2 Modifiers and remanufacturers

5.2.1 Installation

It shall be the responsibility of any company remanufacturing or modifying a machine for installation within the United States to do so in accordance with this standard. Any machines modified 12 months after adoption of this standard shall be brought into total compliance. The entire machine shall comply with the requirements in this standard, not just the modified portion.

5.2.2 Instructions

E5.2.2 Instructions

Many modifications are rebuilding efforts and are so extensive that any original instructions from the original manufacturer are incorrect or meaningless.

It shall be the responsibility of any company remanufacturing or modifying machinery to furnish adequate instructions and schematics with the modifications made, to establish new guidelines for operation and maintenance of the machine, and to make training available to the employer. Complete electrical schematics shall be supplied if electrical changes or additions have been made. Signs and identification markings on any modified machine shall be added to comply with the requirements in 5.3.

5.3 Signs

All signs shall conform with ANSI Z535-1991 in color, format, size and content, where feasible.

5.3.1 The signs shall contain sufficient information to be understood.

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5.3.2 All machinery shall be permanently identified with the manufacturer's name, address, model identification, and shall include the maximum electrical power requirements of the equipment. This identity marking shall be of sufficient durability to withstand the environment involved.

5.3.3 If the machine has been modified or remanufactured, the identity of that remanufacturer shall be permanently affixed on the machine next to the original manufacturer's identification plate (5.3.2).

5.4 General electrical requirements

Machines shall be built and installed in accordance with the requirements of ANSI/ NFPA 79-1994.

5.5 General machine guards

An enclosure or other suitable barrier guard, in addition to guards already specified, shall protect the operator from unintentional contact with hazardous parts of the machine.

5.6 Examples

Barrier guards (3.7) shall be used to cover pulleys, belts, sprockets, chains, drive shafts, gears, and other hazards.

6 Responsibility of others

6.1 Employer

It shall be the employer's responsibility to ensure that all set-up personnel, machine operators, and helpers are adequately trained and competent to perform the functions for which they are responsible safely. The operator shall be made aware of the hazards in operating this machinery.

6.1.1 It shall be the responsibility of the employer to provide a clean work area around the cutting equipment so as to permit safe operating and routine maintenance practices.

6.1.2 It shall be the responsibility of the employer to establish and follow a program or periodic inspections of his or her cutting equipment, auxiliary equipment, and safety guards to ensure correct adjustment and safe operating conditions.

E5.3.2 See Illustration 1.

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6.1.3 Due to the general purpose and nature of most cutting equipment, it is impossible for the equipment manufacturer to anticipate all possible uses of the machine. Therefore, each employer shall analyze his or her particular operation and provide additional guarding, if necessary.

6.1.4 It is the employer's responsibility to see that all existing equipment is updated in accordance with the requirements in 1.3.2.

6.2 Operator

It shall be the responsibility of the operator to:

a) follow all training and safety practices for the function for which they are responsible;

b) notify their employer when they note an unsafe condition on their cutting equipment;

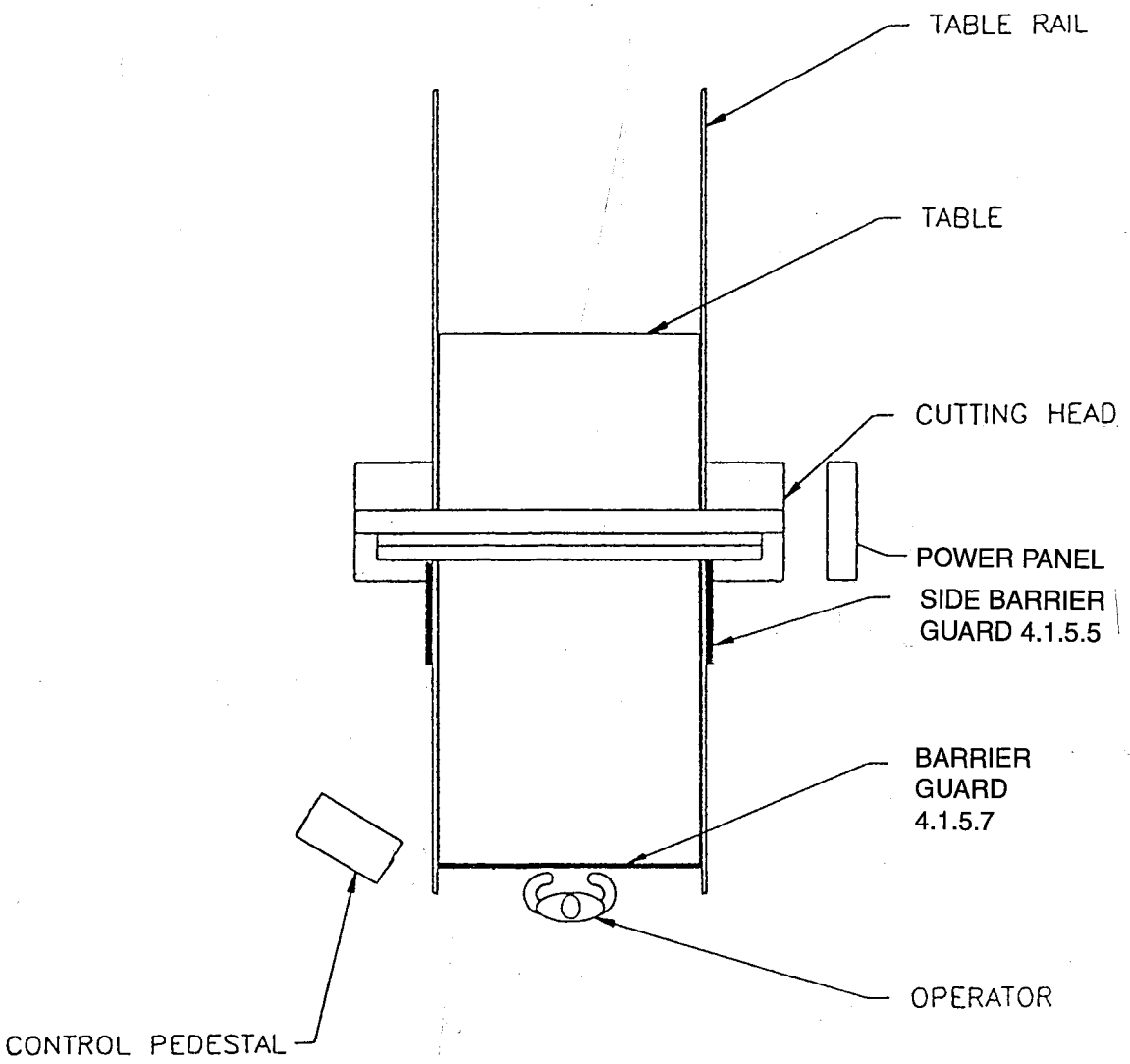
c) properly use personal protective equipment and practices as specified by their employer;

d) maintain all safety devices intact;

e) maintain an orderly work area. Particular attention should be given to the storage of tools and stacking of cut parts that could be dislodged and fall or roll.

E6.2(c) The operator should wear safety glasses at all times.

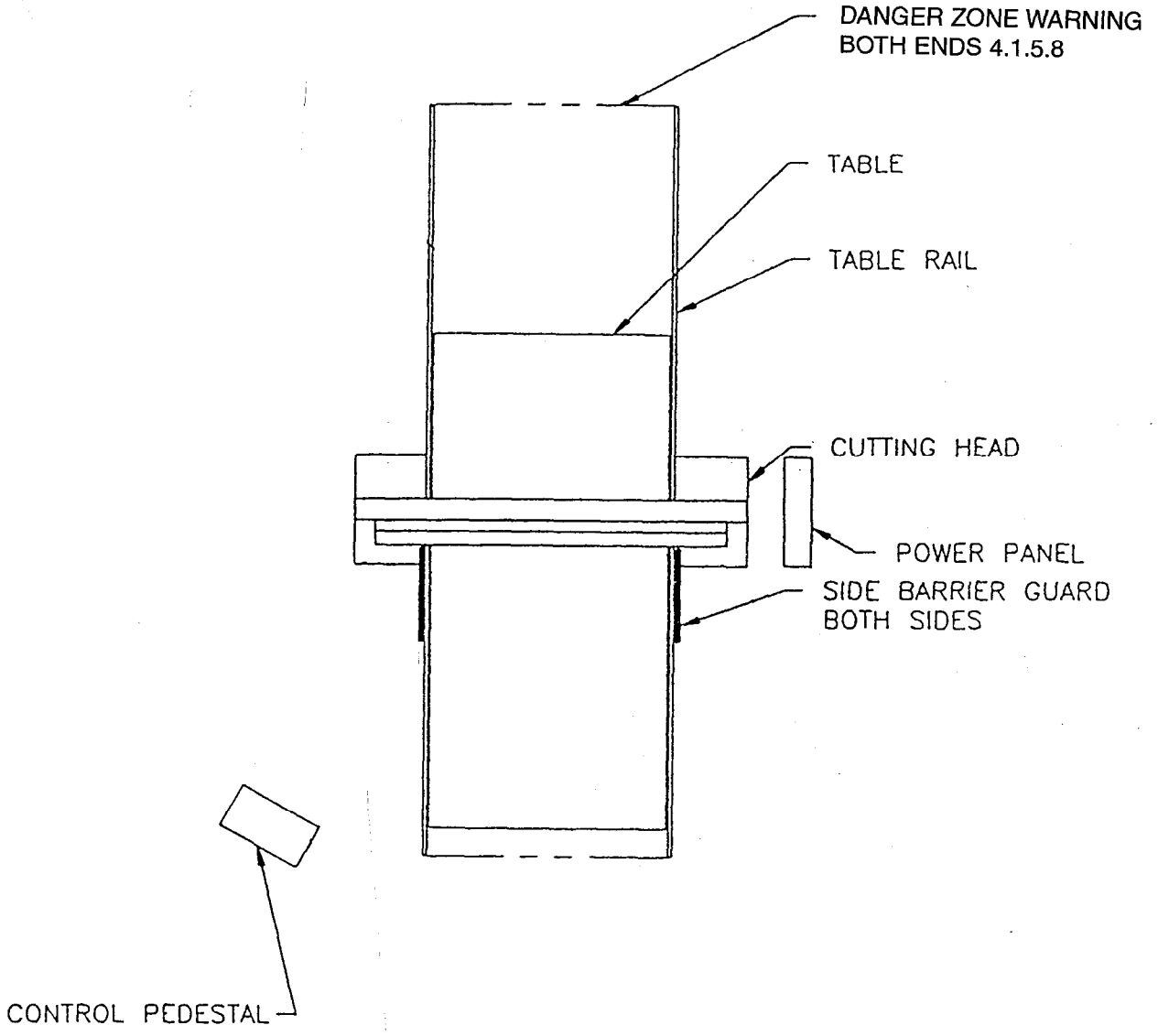
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a) Machine with manual table

Figure 1 – Horizontal cutting machine

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b) Machine with automatic table

Figure 1 *(concluded)*

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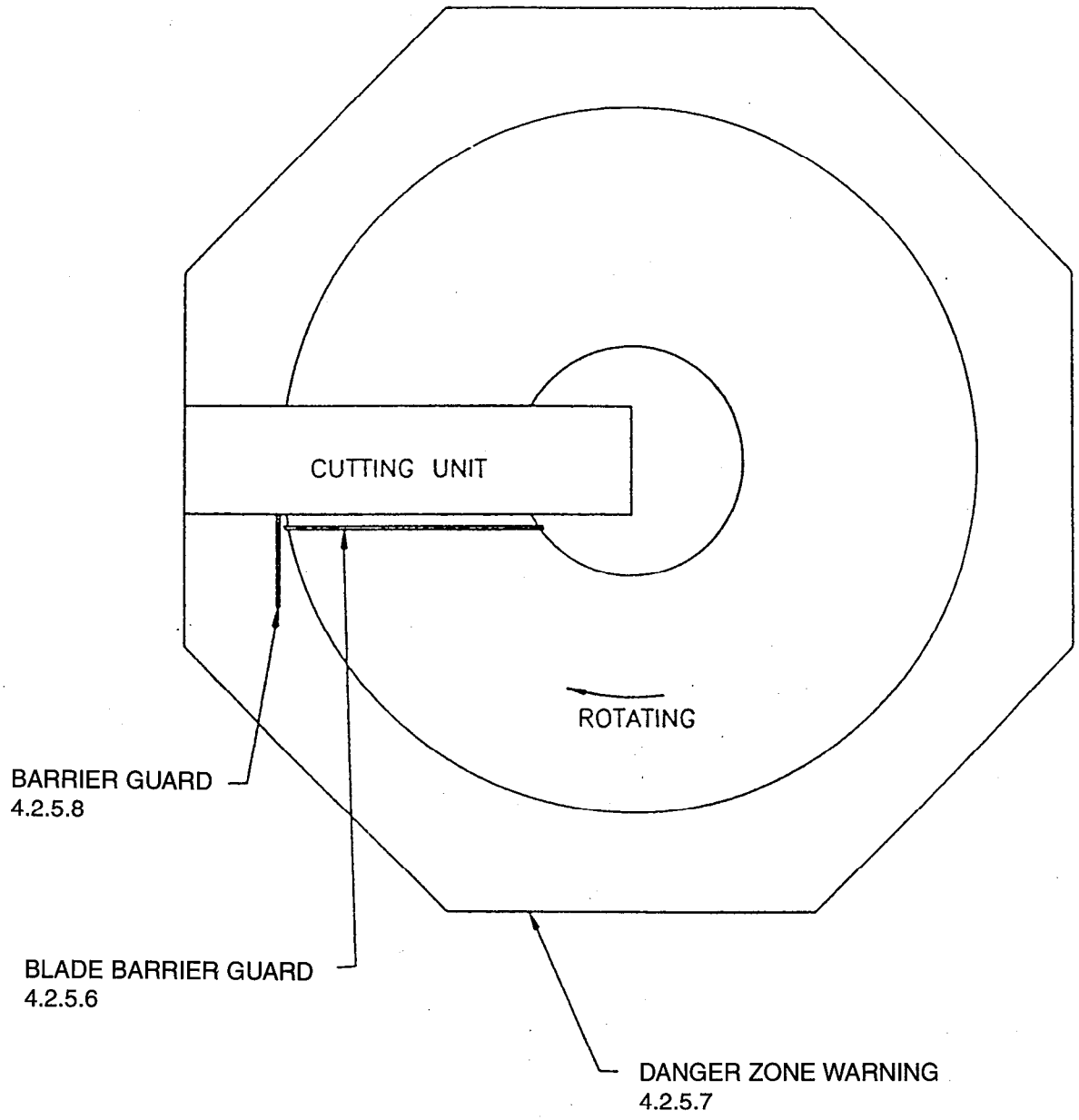


Figure 2 – Carousel

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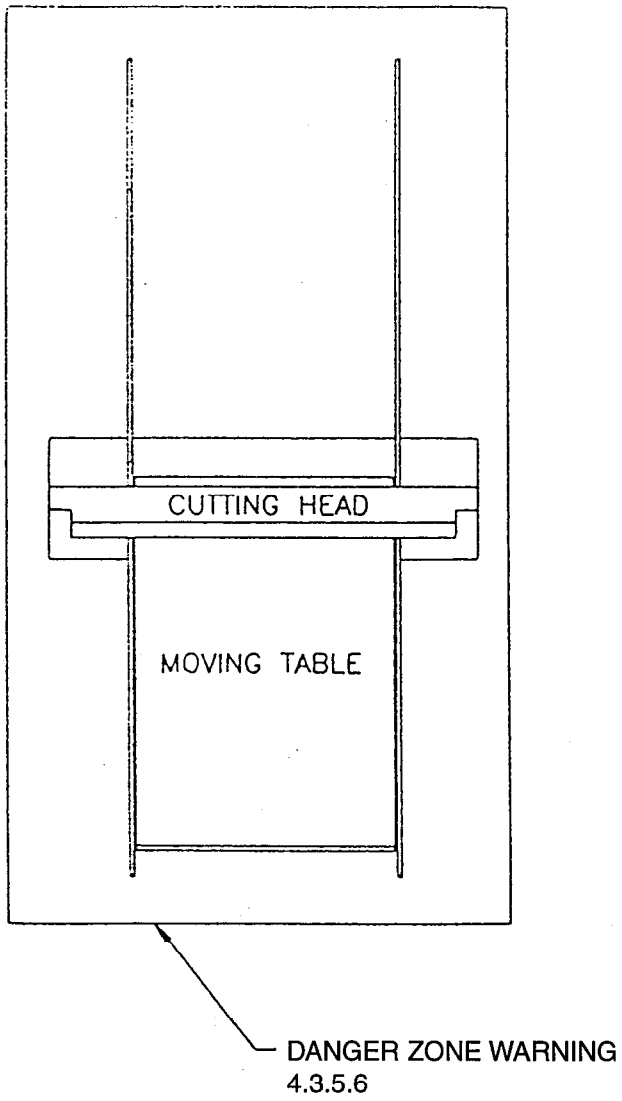


Figure 3 – Automatic profile cutter

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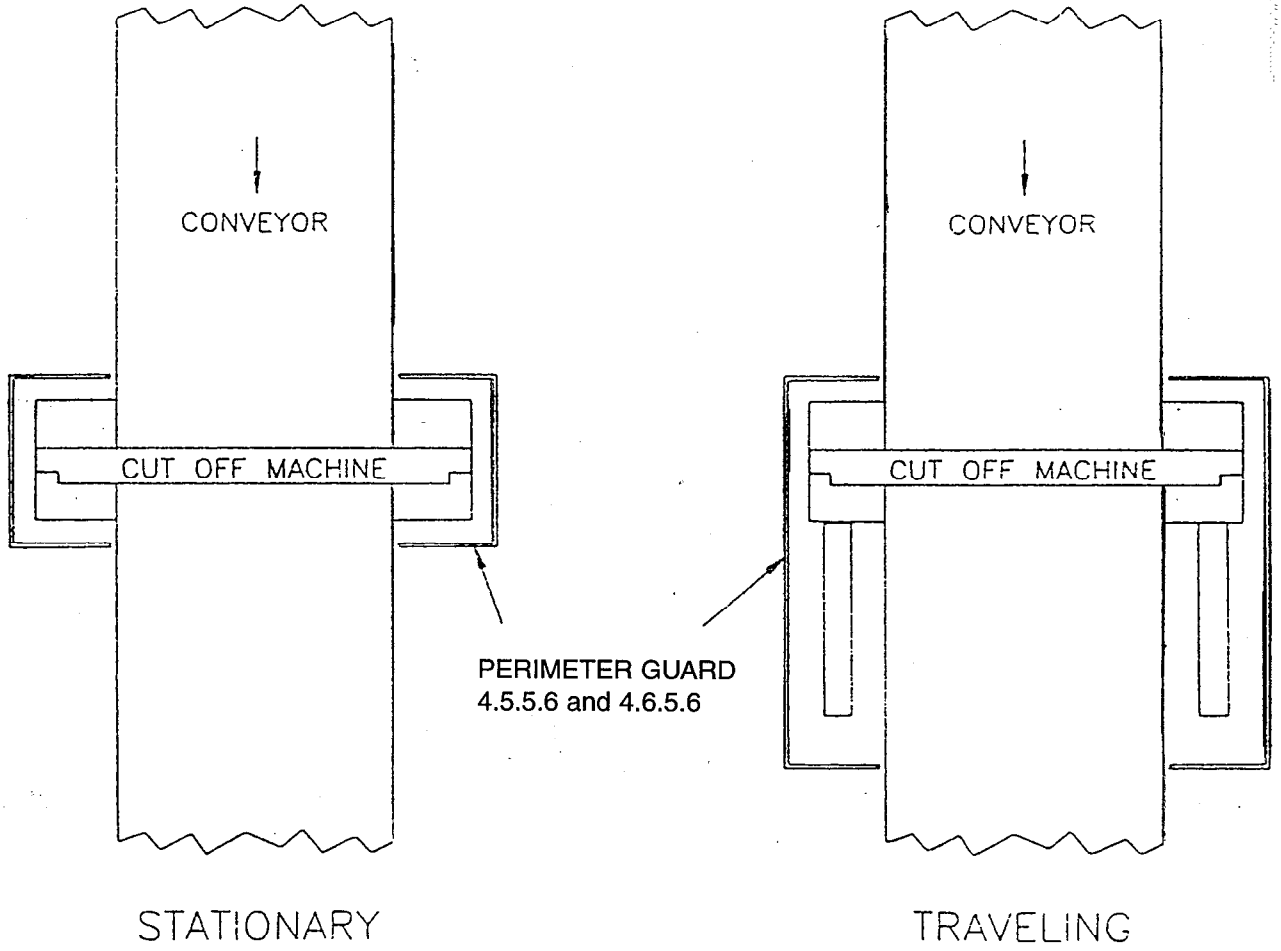


Figure 4 – Cut-off machine

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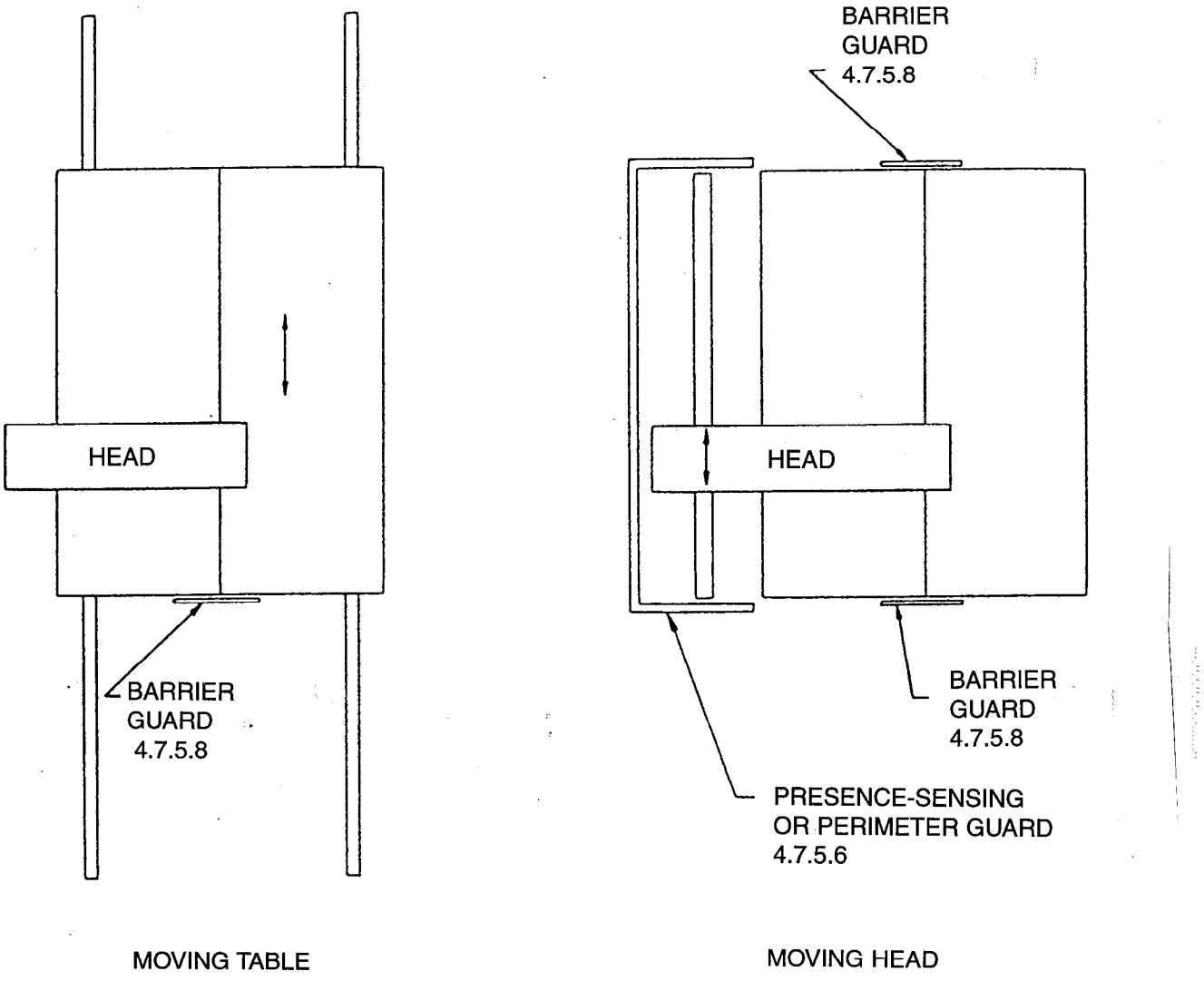


Figure 5 – Vertical saw (Vertical cutting machine)

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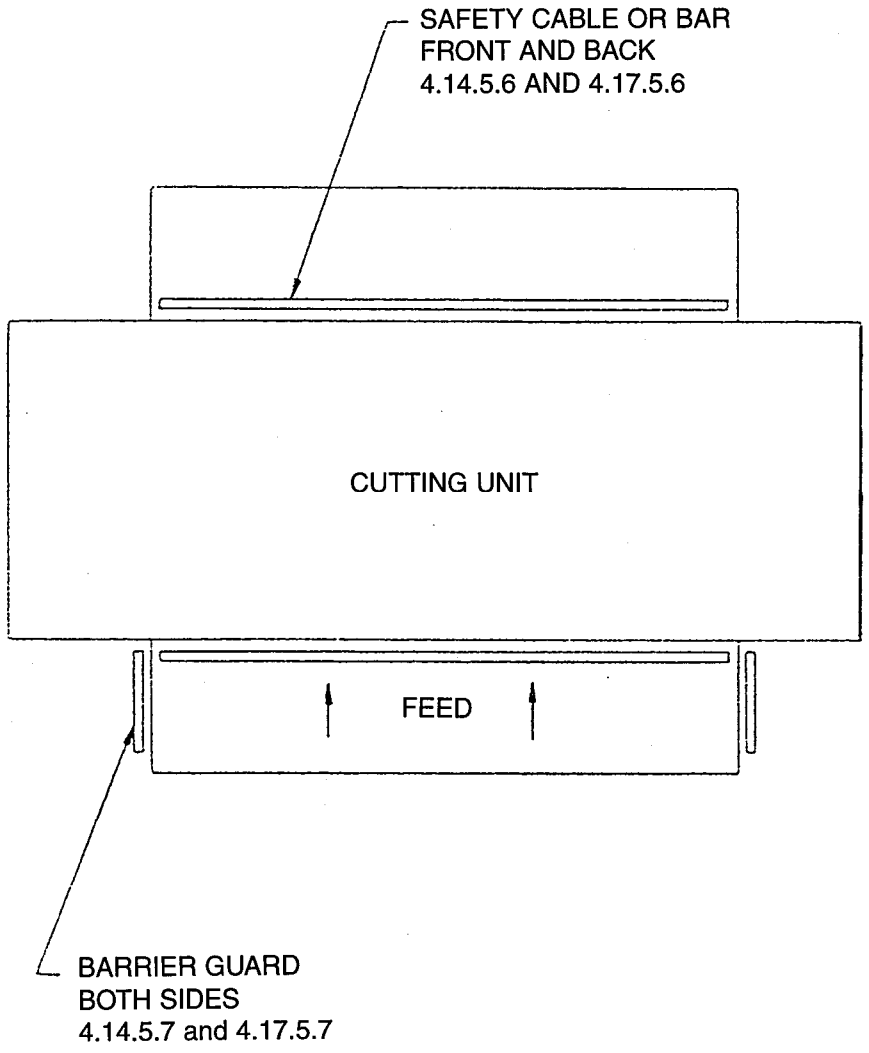


Figure 6 – Convoluter, compression cutter, and roll stock splitter

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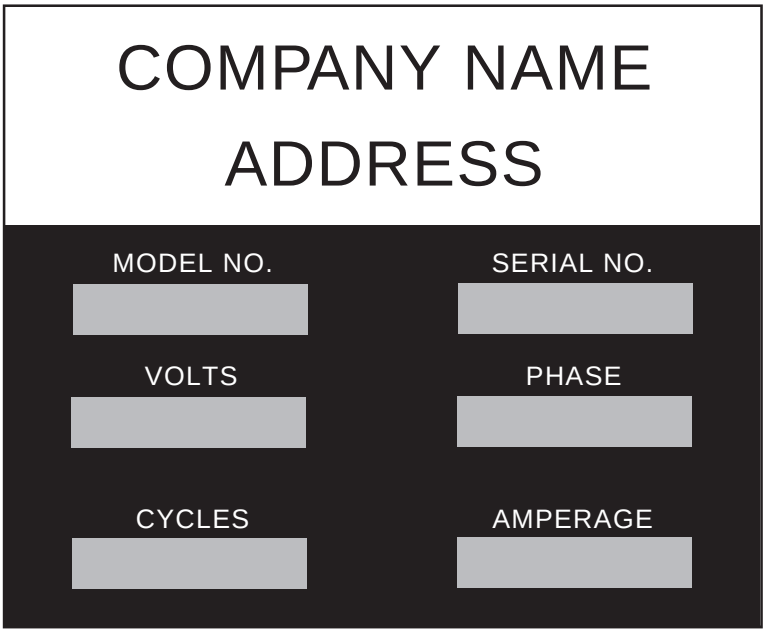


Illustration 1 – Identification plate

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