ANSI B11.1–2009 (R2020)

American National Standard

Safety Requirements for Mechanical Power Presses

ANSI-Accredited Standards Developer and Secretariat.

B11 Standards, Inc.
POB 690905
Houston, TX 77269, USA

Approved: April 7, 2009
Reaffirmed: May 8, 2020
by the American National Standards Institute
Board of Standards Review

AMERICAN NATIONAL STANDARDS

By approving this American National Standard, the ANSI Board of Standards Review confirms that the requirements for due process, consensus, balance and openness have been met by B11 Standards, Inc. (BSI) (the ANSI-accredited standards developing organization).

American National Standards are developed through a consensus process. Consensus is established when substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward resolution. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While BSI administers the process and establishes procedures to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards or guidelines.

American National Standards are promulgated through ANSI for voluntary use; their existence does not in any respect preclude anyone, whether they have approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards. However, users, distributors, regulatory bodies, certification agencies and others concerned may apply American National Standards as mandatory requirements in commerce and industry.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of an American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the Secretariat (BSI).

BSI MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED AS TO THE FITNESS OF MERCHANTABILITY OR ACCURACY OF THE INFORMATION CONTAINED WITHIN THIS STANDARD, AND DISCLAIMS AND MAKES NO WARRANTY THAT THE INFORMATION IN THIS DOCUMENT WILL FULFILL ANY OF YOUR PARTICULAR PURPOSES OR NEEDS. BSI disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, application or reliance on this document. BSI does not undertake to guarantee the performance of any individual supplier or seller's products or services by virtue of this standard or guide, nor does it take any position with respect to the validity of any patent rights asserted in connection with the items which are mentioned in or are the subject of this document, and BSI disclaims liability for the infringement of any patent resulting from the use of or reliance on this document. Users of this document are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

In publishing or making this document available, BSI is not undertaking to render professional or other services for or on behalf of any person or entity, nor is BSI undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment, or as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

BSI has no power, nor does it undertake to police or enforce conformance to the requirements of this document. BSI does not certify, test or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of conformance to any health or safety-related information in this document shall not be attributable to BSI and is solely the responsibility of the certifier or maker of the statement.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. You may contact the Secretariat for current status information on this, or other B11 standards. Individuals interested in obtaining up-to-date information on standards can access this information at http:\\www.nssn.org (or by contacting ANSI). NSSN - A National Resource for Global Standards, provides a central point to search for standards information from worldwide sources and can connect those who seek standards to those who supply them.

Published by: B11 Standards, Inc.
POB 690905, Houston, TX, 77269 USA

CONTENTS ..... PAGE

Foreword

(This foreword is not part of the requirements of American National Standard B11.1–2009 (R20))

The objective of this standard is to eliminate injuries to personnel from mechanical power press production systems by establishing requirements for the construction of mechanical power presses, and requirements for the set–up, operation and maintenance of the production systems in which presses are used. This standard should be used by builders, users, modifiers, and rebuilders, as well as by the appropriate authority having jurisdiction. Responsibilities have been assigned to the supplier (i.e., the manufacturer, the rebuilder and the modifier), the user, and the user personnel to implement this standard (see flowchart in the Introduction).

The words "safe" and "safety" are not absolutes. While the goal of this standard is to eliminate injuries, it is recognized that risk cannot be reduced to zero in any human activity. This standard is not intended to replace good judgment and personal responsibility. Operator skill, attitude, training, and experience are safety factors that must be considered by the user.

The safeguarding of press production systems in stamping operations is complicated by the wide variety of operations and operating conditions, due to the variations in size, speed and type of press used; the size, thickness and kind of pieces to be worked; the design and construction of dies; the required accuracy of the finished work; the skill of operators; the length of run; and the method of feeding, including part and scrap removal. Because of these varying factors in the operations and in the workplace, a wide variety of point–of–operation safeguarding methods (guards and protective devices) has been covered in this standard.

Point–of–operation safeguarding, the single most important factor in the elimination of injuries from presses, can only be determined by the user. A production system consists of the press as one component, dies (tooling) as another component, feeding methods (including part or scrap removal) as a third component, and point–of–operation safeguarding as the fourth component. The vital fourth component can be evaluated for effectiveness only after the first three components and operator involvements are known. Since this information is known only by the user, the responsibility for conformance with clause 8 has been assigned accordingly. The assignment of responsibility of the user for proper point–of–operation safeguarding has existed since the first B11.1 standard, approved in 1922.

Mechanical power presses and associated equipment technologies are continuously evolving. This standard reflects the most commonly used and time-tested state of the art at the time of its approval. The inclusion or omission of language relative to any evolving technology, either in the requirements or explanatory area of this standard, in no way infers acceptance or rejection of such technologies.

HISTORY

The project on Safety Standard for Power Presses, B11, was initiated under the procedures of the American Engineering Standards Committee (which became the American Standards Association, the United States of America Standards Institute, and in 1969 the American National Standards Institute), with the National Safety Council as sponsor. The first standard, bearing the title *Safety Code for Power Presses and Foot and Hand Presses*, was developed by Sectional Committee B11 and was approved on November 13, 1922. Only two purposes of that “code" were listed. The first and primary use was for state industrial commissions in developing their workplace codes. The second use was as an operating guide for users operating press production systems. Revisions of the standard were issued on November 11, 1926; October 22, 1937; January 12, 1948; January 19, 1960; February 17, 1971; January 22, 1982; April 4, 1988; and November 6, 2001.

The philosophy underlying the 1971 standard was hands–out–of–die operation (HOOD). After the adoption of the 1971 standard by ANSI and its reference by OSHA regulations, many users documented an absolute inability to meet the hands–out–of–die objective. Accordingly, in 1974 OSHA modified the HOOD requirement, and subsequent versions of the ANSI B11.1 standard incorporate that modification. However, HOOD should be considered in the application of the press production system, with appropriate safeguarding, to enhance the safe operation of mechanical power presses.

In this 2009 edition of the standard, the B11.1 Subcommittee reviewed the B11.1 2001 standard to incorporate current mechanical power press safety practice, and to increase explanatory material related to the standard. New areas that have been added include requirements for risk assessment and risk reduction for increasingly complex automatic press production systems that may include tandem and transfer presses with use of perimeter safeguarding. In addition, new pressroom technology including direct drive servo presses has been incorporated. The current edition also integrates NFPA 79 requirements directly within the standard, including two hand control and stop function requirements, moving parts (other than point-of-operation) and safeguarding supplier responsibilities. Finally, the current edition of ANSI B11.1 provided new requirements for slide locks, moving bolsters and scrap chutes.

Subsequent to beginning the revision of B11.1, the ANSI B11 Accredited Standards Committee (ASC) authorized creation of an overarching ("A-level") standard dealing with general safety requirements for the entire series of machines. ANSI B11 was approved in August 2008. Since B11.1 was already well into its revision at that point, the B11 ASC agreed to allow this current (2009) version of the ANSI B11.1 standard to proceed absent integration with the ANSI B11 "A-level" standard.

Effective Date

The following information on effective dates is informative guidance only, and not a normative part of this standard. The subcommittee recognizes that some period of time after the approval date on the title page of this document is necessary for suppliers and users to develop new designs, and/or modify existing designs or manufacturing processes in order to incorporate the new and/or revised requirements of this standard into their product development or production system.

The subcommittee recommends that suppliers complete and implement design changes for new machine tools and machine tool systems within 30 months of the approval of this standard.

The subcommittee recommends that users should evaluate whether an existing machine tool and machine tool system has acceptable risk within 30 months of the approval date of this standard using generally recognized risk assessment methods. If the risk assessment shows that modification(s) is necessary, refer to the requirements of this standard or the machine specific standard to implement protective measures for appropriate risk reduction.

Inquiries with respect to interpretations of this standard, and suggestions for its improvement, are welcomed and should be sent to B11 Standards, Inc. POB 690905, Houston, TX, 77269-0905 Attention: B11 Secretariat. This standard was processed and submitted for ANSI approval by the B11 Accredited Standards Committee on Safety Standards for Machines. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time this standard was approved as an American National Standard, the ANSI B11 Accredited Standards Committee was composed of the following member organizations:

John W. Russell, PE, CSP, Chairman
Gary D. Kopper, Vice-Chairman
David A. Felinski, Secretary

Organizations Represented	Name of Representative	
	Delegate	Alternate
Aerospace Industries Association of America	Willard J. Wood, ARM	Lance E. Chandler, PE
Aluminum Extruders Council	Melvin Mitchell	Doug Hart
American Society of Safety Engineers	Bruce W. Main, PE	George V. Karosas, PE, CSP
Association For Manufacturing Technology	Russell A. Bensman	Alan Metelsky
Automotive Industry Action Group	Nancy Malo	David A. Lalain
The Boeing Company	Don R. Nelson	Joe Oberuc
Canadian Standards Association	Elizabeth Rankin	Tom Eastwood
Can Manufacturers Institute	Geoff Cullen	Jenny Day

Deere and Company	Gary D. Kopps	Scott Fowler
General Motors Corporation	Michael Douglas	Michael Taubitz
Metal Building Manufacturers Association	Charles M. Stockinger	Charles E. Praeger
Metal Powder Industries Federation	Dennis R. Cloutier, CSP	Teresa F. Stillman
National Institute for Occupational Safety and Health	Richard S. Current, PE	James R. Harris, PE
Occupational Safety & Health Administration	Kenneth Stevanus	Robert Bell
Packaging Machinery Manufacturers Institute	Charles F. Hayes	Maria Ferrante
Pilz Automation Safety, LP	Roberta Nelson Shea	Craig Torrance / Lee Burk
Property Casualty Insurers	John W. Russell, PE, CSP	Keith Lessner
Precision Metalforming Association	William E. Gaskin	James G. Barrett, PhD
Presence Sensing Device Manufacturers Association	James V. Kirton	Michael S. Carlson
Rockwell Automation	Michael B. Miller	Steve Dukich
Robotic Industries Association	Jeff Fryman	
OMRON Scientific Technologies Incorporated	Frank Webster	Christopher Sorrento
Sheet Metal & Air Cond. Contractors Natl. Assn.	Michael McCullion	Roy Brow
System Safety Society	John Etherton; PhD, PE	Rod Simmon, PhD
Tooling and Manufacturing Association	Daniel Kiraly	
Toyota Motor Manufacturing North America	Barry Boggs	Tod Wells

At the time this standard was approved, the ANSI **B11.1 Subcommittee** had the following members who participated in the development of this revision:

Dennis Cloutier, Co-Chairman	Cloutier Consulting
Russell Bensman, Co-Chairman	The Minster Machine Company
Cindy Haas, B11.1 Secretary	The Association For Manufacturing Technology
James G. Barrett, PhD	Link Systems
Kelyn Brown	Delta Holding Corporation.
Stanford A. Brubaker	Liberty Mutual Insurance Group
Scott Buchanan	Toyota Engineering and Manufacturing America
Lee Burk	Pilz Automation Safety L.P.
Michael Carlson	Banner Engineering
Wayne Casebolt	General Motors Corporation
Gary Dunn	Dunn Consulting
Dennis Ebens	Danray Products LLC
David Hayes	Wintriss Controls of Honeywell
Heinz Knackstedt	C & E Sales, Inc.
Joseph Knapp	Johnson Controls, Inc.
Scott E. Miller	AIDA-America Corporation
Joseph R. Mistory	Chrysler Corporation
William C. Roorda, PE	Alcona Associates
Theodore Sberna	Applied Engineering Concepts
George M. Schreck	Komatsu America Industries, LLC
Kyle Sullivan	General Motors Corporation
Jerome B. (J.B.) Titus	Siemens Energy & Automation
Jim Van Kessel, P.Eng.	JVK Industrial Automation Inc.
Walter Veugen	Veugen Integrated Technologies Ltd.
Ron Walters	Chrysler Corporation
Robert Weaver	Schuler Incorporated

Explanation of the format, and ANSI B11 conventions

The standard uses a two-column format to provide supporting information for requirements. The material in the left column is confined to “Standards Requirements” only, and is so captioned. The right column, captioned "Explanatory Information" contains information that the writing Subcommittee believed would help to clarify the requirements contained in the standard. This column should not be construed as being a part of the requirements of this American National Standard.

As in all American National Standards, the term “SHALL” denotes a requirement that is to be strictly followed in order to conform to this standard; no deviation is permitted. The term “SHOULD” denotes a recommendation, a practice or condition among several alternatives, or a preferred method or course of action.

Similarly, the term “CAN” denotes a possibility, ability or capability, whether physical or causal, and the term “MAY” denotes a permissible course of action within the limits of the standard.

B11 conventions: Operating rules (safe practices) are not included in either column of this standard unless they are of such nature as to be vital safety requirements, equal in weight to other requirements, or guides to assist in conformance with the standard. The B11 standards generally use the term “OR” as an inclusive disjunction, meaning *one or the other or both,* but on occasion will use the term “and/or” to emphasize the fact that both are fully intended in cases where the Subcommittee believed it was imperative to make that clear. A distinction between the terms “*individual*” and “*personnel*” is drawn. Individual includes personnel (employees, subcontractors, consultants, or other contract workers under the indirect control of the supplier or user) but also encompasses persons who are not under the direct or indirect control of the supplier or user (e.g., visitors, vendors, etc.).

Suggestions for improvement of this standard will be welcome. They should be sent to B11 Standards, Inc., POB 690905, Houston, TX, 77269-0905 - Attention: B11 Secretariat.

Introduction

The requirements of this ANSI standard are grouped according to those that apply to the supplier (i.e., manufacturer, rebuilder, modifier) and user. Some are shared between the supplier and user and are so indicated. Figure 1 provides an overview of this standard and in particular the responsibilities of and requirements for the supplier and user, including the user personnel. Numbers in parentheses denote the particular clause or subclause of the standard.

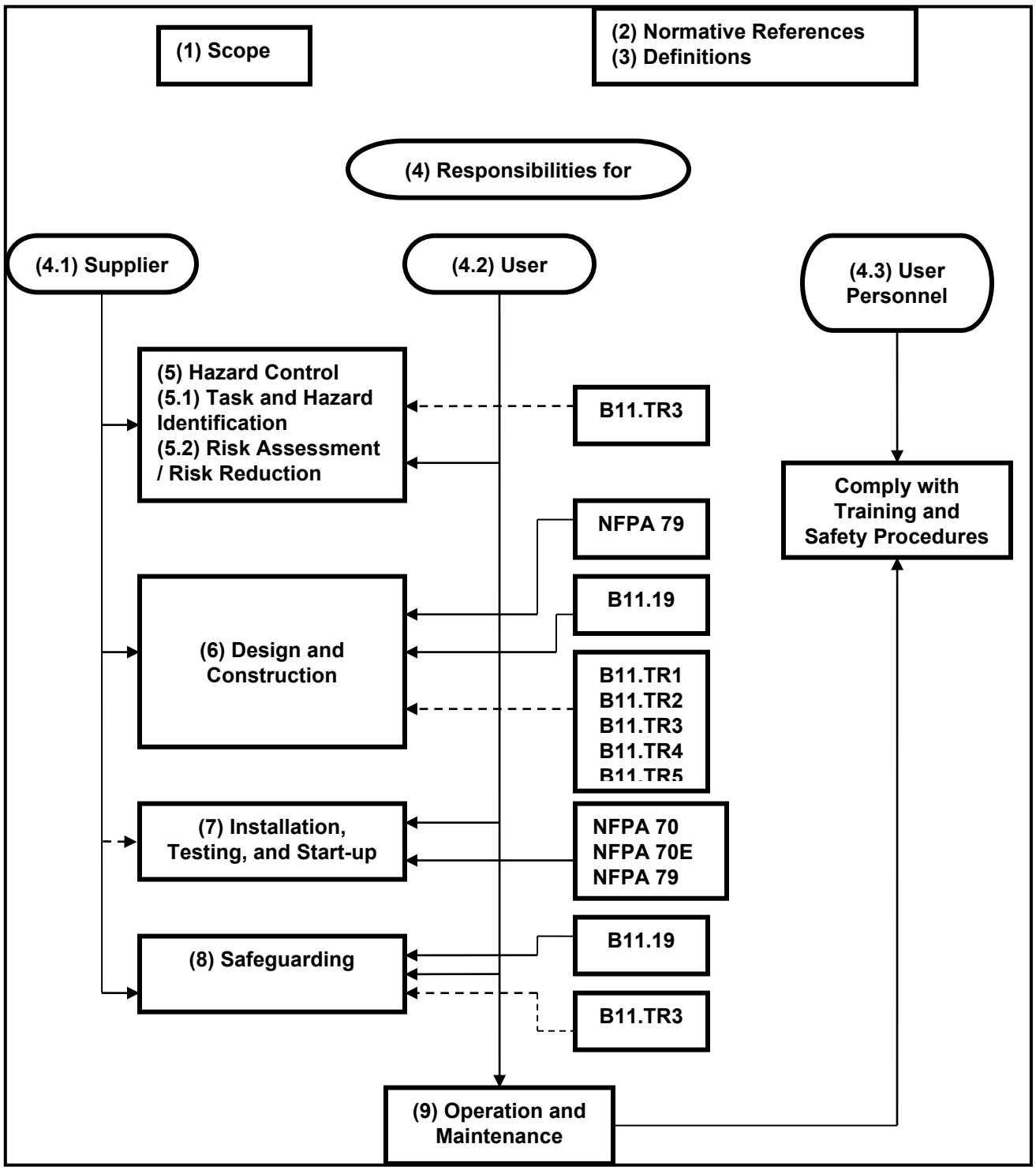

Figure 1 – General layout of the standard showing the various responsibilities

Notes for Figure 1:

1) Scope – Provides the boundaries or limits of the standard (i.e., what is/is not included).
2) Normative references – Other standards which in whole or in part provide additional requirements when referenced in the normative text (i.e., left-hand column of clauses 4 – 9) of this standard.
3) Definitions – Terms used in this standard, together with their definitions (terms used in the same context as are generally understood and commonly used in everyday English are not defined).
4) Responsibility – The general responsibilities of the supplier (builder), user, and the user personnel are listed in clause 4 together with which of the remaining clauses they have primary responsibility.
5) Hazard control (task/hazard identification & risk assessment/risk reduction) – Although clause 5 is intended to require a shared responsibility between supplier and user, the requirements of this clause may fall primarily on either entity (see B11.TR3 for further explanation of hazard/task identification and risk assessment/risk reduction).
6) Design and construction – It is assumed that the supplier will be responsible for the requirements of clause 6 with the understanding that the user may add to or modify these requirements through the purchase agreement.
7) Installation, testing and start-up – Although the requirements of clause 7 are predominantly the responsibility of the user, the supplier will normally provide assistance either directly (providing personnel) or indirectly (instruction materials).
8) Safeguarding – This is normally a shared responsibility but often, either the supplier or the user will provide the requirements of clause 8.
9) Operation and maintenance – The user is normally responsible for the requirements of clause 9 with possible assistance from the supplier for training.

A solid line between a block showing reference standard(s) and a block showing a normative clause denotes part of the requirements. A dashed line denotes an informative reference.

American National Standard for Machine Tools -
Safety Requirements for Mechanical Power Presses

STANDARDS REQUIREMENTS	EXPLANATORY INFORMATION
	(Not part of the requirements of this American National Standard for Machine Tools – Safety requirements for Mechanical Power Presses - ANSI B11.1 – 2009 (R20))
1 Scope	***E1***
The requirements of this standard apply only to those mechanically powered machines, commonly referred to as mechanical power presses, which transmit force mechanically to cut, form, or assemble metal or other materials by means of tools or dies attached to or operated by slides.	See Annex A, Figures A.1 and A.2. The requirements of this standard are aimed at eliminating injuries to operator, maintenance, and set–up personnel, while working on or adjacent to a mechanical power press. This standard does not establish requirements for personal protective equipment that may be needed for specific operations.
1.1 Inclusions	***E1.1***
The requirements of this standard shall apply to: • Mechanical power presses (as above); • transfer presses; • tandem line presses; • presses used in production cells; • automatically fed presses; • manually fed presses.	See also, Annex A, Figures A.18 and A.20. See also, Annex A, Figure A.19.
1.2 Exclusions	***E1.2***
Excluded from the requirements of this standard are the following:	These exclusions exempt machines that normally do not have the characteristics of mechanical power presses, or are addressed by specific standards. If a machine is not addressed by a specific B11 standard, see ANSI B11 (*General Safety Requirements)* for guidance.
a) bulldozer	a) A slow–acting horizontal mechanical press with a large bed used for bending, straightening, etc. The work, which is done between dies, can be either hot or cold. The machine is closely allied to a forging machine.
b) cold header and cold former	b) Cold headers and cold formers perform many operations such as shearing, heading, upsetting, extruding, trimming, forming, cold working or warm forming material by means of tools and dies. See ANSI B11.7.
c) eyelet machine	c) An automatic multiple station transfer feed machine for making drawn stampings by use of cam-driven adjustable plungers, acting from above and below the workpiece, and to which individual tool elements are attached.

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION
d) forging presses and hammer	d) See ANSI B24.1.
e) high–energy–rate press	e) A class of press equipment wherein high ram velocities resulting from the sudden release of a compressed gas against a free piston impart impact energy to the workpiece.
f) hot–bending and hot–metal press	f) A press used to form heated metal and that does not include forging operations.
g) hydraulic power press	g) Hydraulic power presses transmit force hydraulically to cut, form or assemble metal or other materials by means of tools or dies attached to or operated by slides. See ANSI B11.2.
h) iron worker and detail punch	h) These include combination multi-purpose machines that punch, shear, notch, cope and form metals or other materials. See ANSI B11.5.
i) metal shear	i) These include mechanically, hydraulically, hydro-mechanically, pneumatically or manually powered shears used to cut material by a shearing action, and which utilize a fixed blade(s) and non-rotary moving blade(s). See ANSI B11.4.
j) pneumatic power press	j) An air– or gas–powered machine that shears, punches, forms, draws, or assembles metal by means of dies actuated by slide(s). See ANSI B11.2.
k) powdered–metal press	k) These include mechanically or hydraulically powered machines that are designed, modified, or converted for the compressing of metallic or nonmetallic powders. See ANSI B11.16.
l) press welder	l) A pneumatically powered gap-frame type of machine that positions parts for assembling by means of resistance welding. Welding fixtures are mounted in the machine with the stationary portion bolted to the frame and the movable portion bolted to the platen.
m) power press brake	m) Press brakes are designed and constructed for the specific purpose of bending metal. To achieve this purpose, the press brake is provided with • a plate-type ram and a plate-type bed with standard provisions for attaching standardized (general purpose) press brake tooling, and • means for operator control of die-closing (cycle control). This machine is sometimes referred to as a “bending brake” or a “brake press.” See ANSI B11.3.
n) riveting machine	n) An electrically or pneumatically powered machine specifically designed to insert and clinch fasteners, commonly called rivets.
o) turret and plate–punching machine	o) A semiautomatic or automatic NC or CNC punch press that holds punches and dies in a movable turret so that a variety of hole shapes and sizes can be punched without having to manually change the tools.

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION
p) wire termination machine	p) Generally, a bench mounted semiautomatic machine tool that mechanically makes efficient electrical interconnections. These fall into one of two general categories: • Crimping machines that mechanically attach a solderless terminal to an electrical wire permanently by the proper application of forces through the correct tooling for the wire terminal and wire being used. This process is generally referred to as "crimping." • Insertion machines that can apply wire, pins, or other types of products into solderless terminals or circuit boards. In most cases, an interference fit is required while in other cases, some clearance is maintained when solder–flow techniques are applied later. This process is generally referred to as "insertion."
q) welding press	q) A mechanically powered machine that positions parts for assembling by means of resistance welding. The machine consists of a frame with an ascending platen. Welding fixtures are mounted in the press, with the upper portion bolted to a stationary-mounting surface which is part of the frame, and the lower portion bolted to the face of the platen. Machines are usually "two post" or "four post," based on the number of members that connect the machine base to the superstructure. The drive is arranged to stop at the top of the platen cycle for the welding process, and at the bottom of the cycle for the unloading and loading process.