

ANSI B11.17-2004 (R2015)

American National Standard for Machine Tools -

***Safety Requirements for
Horizontal Hydraulic
Extrusion Presses***

Secretariat and Standards Developing Organization

**B11 Standards, Inc.
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Houston, TX 77269**

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AMERICAN NATIONAL STANDARDS

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Foreword (This Foreword is not part of the requirements of American National Standard B11.17-2004.)

The primary objective of this standard is to eliminate, control or reduce hazards to individuals associated with horizontal hydraulic extrusion presses by establishing requirements for the design, construction, operation and maintenance of these machines. To accomplish this objective, responsibilities have been assigned to the supplier (e.g., manufacturer, modifier, rebuilder and integrator), the user, and individuals in the working environment.

The words "safe" and "safety" are not absolutes. An element of safety is attitude. While the objective of this standard is to eliminate, control, or reduce hazards, this standard recognizes that hazards cannot be practically reduced to zero in any human activity. This standard is not intended to replace good judgment, proper training, and personal responsibility. Operator skill, job monotony, fatigue, and experience are safety factors that should be considered by the user.

The original B11.17 Standard was approved in 1982 and reaffirmed in 1989 as originally written. B11.17 was then revised and approved in 1996. This current standard was then revised (its third) by the B11.17 Subcommittee, processed and administered by the Secretariat, and approved by the B11 Accredited Standards Committee for submittal to the ANSI Executive Standards Council as an American National Standard.

Horizontal hydraulic extrusion press technology is 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.

Inquiries with respect to the application of the substantive requirements of this standard and suggestions for its improvement are welcomed and are to be sent to the B11 Standards, Inc. POB 690905, Houston TX 77269, USA. Attention: B11 Secretariat.

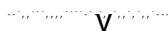
EFFECTIVE DATE

The following is informative guidance only, and not a normative part of this standard. This 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, or modify existing designs or manufacturing processes in order to incorporate the new or revised requirements of this standard into their product development or production system.

This Subcommittee recommends that suppliers complete and implement design changes within 30 months of the approval of this standard.

For existing or modified machines, users should confirm that the equipment / process has tolerable risk using generally recognized risk assessment methods. If the risk assessment shows that modification(s) is necessary, refer to the requirements of this standard to implement protective measures for appropriate risk reduction.

This standard was processed and submitted for ANSI approval by the B11 Accredited Standards Committee on Safety Standards for Machine Tools. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time this document was approved as an American National Standard, the ANSI B11 Accredited Standards Committee was composed of the following member organizations:



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 Gary D. Kopps, Vice-Chairman
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At the time this standard was approved, the ANSI B11 ASC **B11.17 Subcommittee** had the following members who participated in the development of this revision:

Henry W. Dowler, Chairman, Werner Co.	Jerry Burt	Chase Brass
Alan Bartelt PE, Secretary, Alcoa	Floyd Kent	Hydro Aluminum
	David Kurtak	UBE Industries
	Rich Rutkowski	SMS Eumoco Inc.
	Robert Smith	R.L. Best Co.
	Barry Stockton	High Tech Consulting

Explanation of the format, and ANSI B11 conventions

This ANSI B11.17 – 2004 standard is divided into parts formerly referred to as sections or chapters and now referred to as clauses in line with the current ANSI style manual. Major divisions of clauses are referred to as subclauses and, when referenced by other text in the standard, are denoted by the subclause number (e.g., see 5.1).

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 compliance with the standard. The B11 standards do not use the term “and/or” but instead, the term “OR” is used as an inclusive disjunction, meaning *one or the other or both*. 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.). Gauge refers to a measuring or testing instrument; gage refers to a limiting device (e.g., backgage).

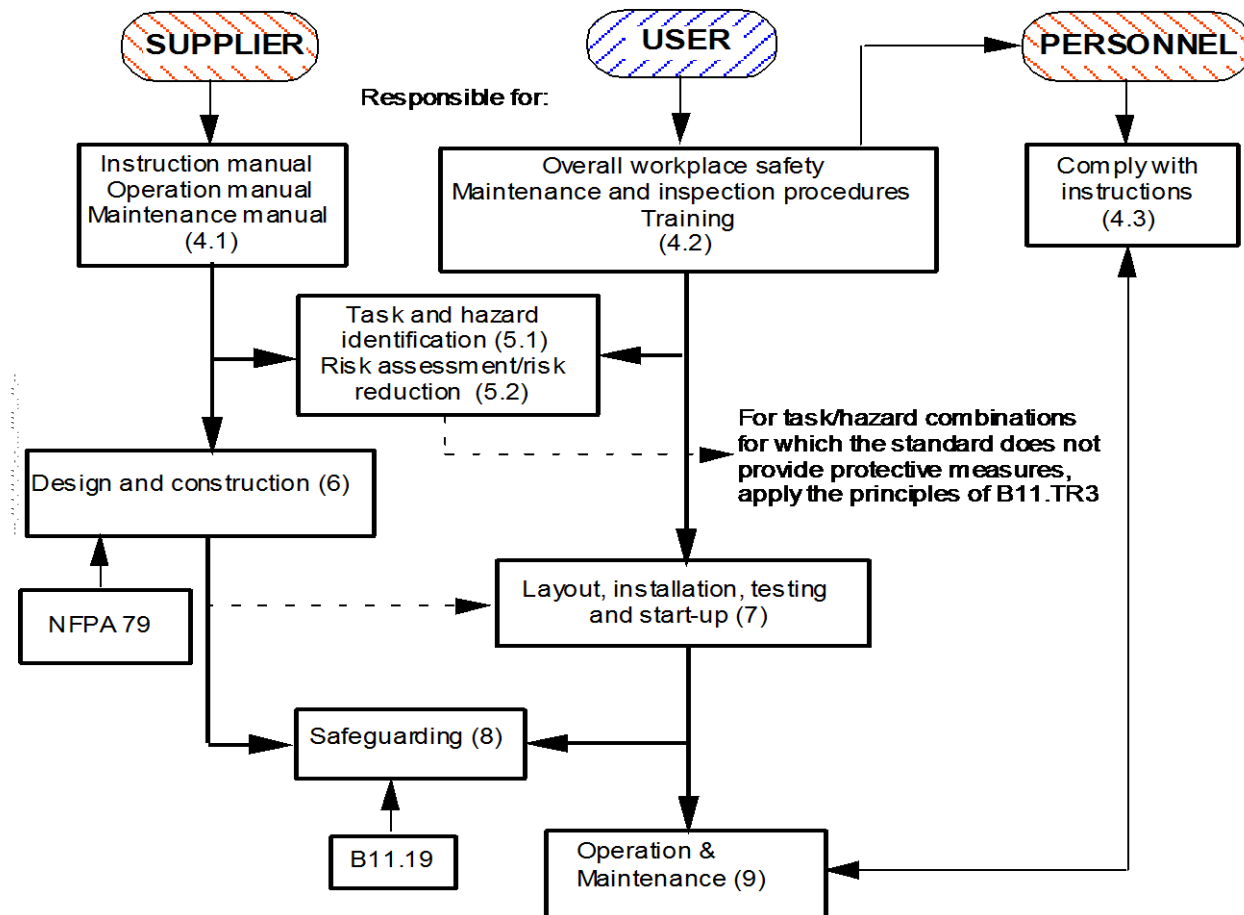
Suggestions for improvement of this standard will be welcome. They should be sent to B11 Standards, Inc. POB 690905, Houston TX 77269, USA - Attention: B11 Secretariat.

Introduction

The primary purpose of every machine tool is to process parts. Hazards exist that may result in injury during production, maintenance, commissioning and de-commissioning.

The primary purpose of the ANSI B11 series of machine tool safety standards is to devise and propose ways to minimize risks of the potential hazards. This can be accomplished either by an appropriate machine design, by restricting personnel or other individuals' access to hazard areas, and by devising work procedures to minimize personnel exposure to hazardous situations. This is the essence of the ANSI B11 series of safety standards.

The responsibility to reduce these risks to a tolerable level, or eliminate them is divided between the equipment supplier, its user and its operating personnel, as follows (numbers in parentheses refer to the clause numbers in these standards which address that responsibility):



As an aid to both supplier and the user, an audit checklist of important requirements has been provided in Annex C.

*American National Standard for Machine Tools -**Safety Requirements for Horizontal Hydraulic Extrusion Presses***STANDARD REQUIREMENTS****EXPLANATORY INFORMATION**

(Not part of the requirements of American National Standard for Machine Tools—Safety Requirements for Horizontal Hydraulic Extrusion Presses- ANSI B11.17-2004)

1 Scope**1.1 General**

The requirements of this standard apply only to those horizontal hydraulically powered presses that extrude metals by means of applying sufficient pressure to an individual metal billet, confined within a container, to force the metal to be extruded through the configured openings of a die. The horizontal hydraulic extrusion press, hereafter referred to as a *press*, is a hydraulically powered machine that functions to extrude metals horizontally either by the direct or indirect process. It includes components necessary to handle and process metals from the loading mechanism through the platen exit or external butt shear. Components include control systems, hydraulic power systems, main force application cylinder and ram, auxiliary hydraulic and pneumatic cylinders that move components that are an integral part of the extruding machine, material loading mechanism, material pressure containment device, tooling used to apply forces to and form the material, tool handling equipment that function with the press operating cycle, shearing mechanisms, and process and equipment lubricating devices.

1.2 Exclusions

Specifically excluded from this standard are hydrostatic extrusion presses, vertical extrusion presses, laboratory presses used to develop extrusion techniques for new materials and products, and extruding machines of unconventional design.

E1.1

See Figures 1, 2 and 10 for examples of horizontal hydraulic extrusion presses.

E1.2

Machines of unconventional design include, but are not limited to, machines that induce extrusion by using rotating circular containers, endless moving steel belts, or moving segmented containers and viscous fluids.

STANDARD REQUIREMENTS

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2 Normative references

The following standards contain provisions that, 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 agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI / ASSE Z244.1–2003, Control of hazardous energy; Lockout/tagout and alternative methods

ANSI / ASME–2001, Boiler and Pressure Vessel Code, Division 1, Section VIII

ANSI B11.19–2003, Performance Criteria for Safeguarding

ANSI / NFPA-70–2002, National Electrical Code

ANSI / NFPA-70E-1994, Electrical Safety Requirements for Employee Workplaces

ANSI / NFPA 79–2002, Electrical standard for industrial machinery

ANSI / NFPA T2.24.1–1991, Hydraulic fluid power - System standard for stationary industrial machinery

ANSI / NFPA/T2.25.1 R2-2003, Pneumatic fluid power - Systems standard for industrial machinery – Supplement to ISO 4414:1998 – Pneumatic fluid power – General rules for systems

ANSI Z535.1 – 2002 Safety Color Code

ANSI Z535.2 – 2002 Environmental and Facility Safety Signs

ANSI Z535.4 – 2002 Product Safety Signs and Labels

E2 Informative references

The documents listed below contain information and guidance for implementation of the requirements of this standard. They are included for information only.

29 CFR 1910.147, Control of hazardous energy (Lockout/Tagout) (See www.osha.gov)

29 CFR 1910.333 b(2): Selection and Use of Electrical Work Practices (See www.osha.gov)

ANSI / ASME B31.1–1993: ASME Code for Pressure Piping–Power Piping

ANSI / SAE J514-1991: Hydraulic Tube Fittings

ANSI / SAE J516-1991: Hydraulic Hose Fittings

ANSI / SAE J517-1991: Hydraulic Hose

ANSI / SAE J518-1991: Hydraulic Flange Connections

ANSI / SAE J524-1991: Seamless Tubing

ANSI / SAE J525-1991: Welded and Cold Drawn Tubing

ANSI / NFPA 12-1993: Carbon dioxide extinguisher systems.

ANSI / NFPA 13-1991: Automatic sprinklers.

ANSI / NFPA 15-1990: Water spray fixed systems (deluge system).

ANSI / NFPA 16-1991: Foam, water sprinkler and spray systems.

ANSI / IES RP7-1990: Practice for Industrial Lighting

ANSI B11.TR1 – 2004. Ergonomic Guidelines for the Design, Installation and Use of machine Tools

ANSI B11.TR3 – 2000. Risk Assessment and Risk Reduction – A guide to estimate, evaluate and reduce risks associated with machine tools.

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3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 accumulator: A vessel containing fluid under pressure used as a source of stored energy.

3.2 automatic: Uninterrupted, multiple cycles without any control action by the operator at the end of individual cycles.

3.3 awareness device: A device or signal that, by means of audible sound or visible light, warns of a present or approaching hazard.

3.4 barrier: A physical boundary to a hazard.

3.5 billet: The form from which extruded shapes are produced.

3.6 butt: The remnant of the billet.

3.7 cleanout block: A device used to remove the remnant of billet material attached to the container wall.

3.8 complementary equipment: Devices used to ensure or augment the proper operation of the safeguarding.

3.9 container: The press component that confines the billet during the extrusion process.

3.10 control reliability - The capability of the press control system, the safeguarding, other control components and related interfacing to achieve a safe state in the event of a failure within their safety-related functions.

3.11 design: To develop and plan the horizontal press to meet the intended purpose and function.

3.12 die-stem assembly: The complement of components through which the extruded shapes pass in the indirect-extrusion process. The assembly includes the extrusion die, backup tooling and the hollow stem.

3.13 direct-extrusion process: The method of producing extruded shapes in which the pressurized billet is pushed through the container by the extrusion stem, forcing the metal through the stationary extrusion die.

3.14 dummy block (fixed or loose): A device to seal the billet in the container during extrusion.

3.15 ensure: To establish, maintain and monitor an effective program, procedure or system to implement the requirements of this standard.

3.16 extrusion die: A tool having in it a configured opening(s) through which the billet is forced to create an extruded shape(s).

E3.1 An accumulator may be used with pumping equipment to supply fluid power to one or more extrusion presses.

E3.5 The word "billet" refers to all of the various configurations or compositions of the metallic forms used in the extrusion process.

E3.8 See E8.8 and clause 12 of ANSI B11.19.

E3.10 See also, *safety-related function*.

E3.13 See Figure 3, Annex A.

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3.17 extrusion stem: The press component used to apply force to the billet within the container in the direct-extrusion process.

3.18 guard: A barrier that prevents entry into the point of operation or other hazard area.

3.19 hazard area: An area or space that poses an immediate or impending physical hazard.

3.20 immediate stop command: A command that initiates an action(s) to stop a hazardous motion (or situation) at any point in the press cycle.

3.21 indirect-extrusion process: The method of producing extruded shapes in which the pressurized billet remains fixed within the container and the metal is forced through the extrusion die and die-stem assembly.

3.22 individual: A person, including personnel, who may or may not be under the direct control of the supplier or user.

3.23 integrator: Any supplier that designs, provides, manufactures or assembles a press, its associated machines or equipment, the safeguarding, control interfaces, interconnections or the control system into a press. See also, *supplier*.

3.24 intensification: Pressure increase that is inversely proportional to the area ratios of a cylinder. Intensification can develop pressures several times higher than what can be developed by the pump.

3.25 interlock: A means or device that allows a hazardous condition to exist only when a predetermined set of conditions are met.

3.26 manual: The operation of the press that requires the operator to initiate and maintain motion of each press component during the cycle or a portion of the cycle by the use of the actuating means.

3.27 manufacturer: Any supplier that designs, manufactures or assembles a press. See also, *supplier*.

3.28 mode selector: One or more means used to establish the press mode.

3.29 modification: To make a change to the press that changes its original purpose, function, capacity, operation or safeguarding requirements.

NOTE - For the purposes of this standard, "**modification**" includes any effects that the changes have on other portions of the press including safeguarding, not directly a part of the modification.

E3.21 See Figure 4, Annex A.

E3.22 For the purposes of this standard, a distinction between *individual* and *personnel* is drawn. The term 'individual' includes personnel but encompasses persons who are not under direct or indirect control of the supplier or user (e.g., visitors, vendors, etc.). See also, *personnel*.

E3.25 The word "interlock" means a control device, such as a limit switch, proximity switch, pressure switch, etc., which when activated indicates that a press component is in a condition or position to permit or to prevent subsequent movements of other components.

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3.30 modifier: Any supplier that changes the original purpose, capacity or function of the press by design or construction. (See also, *supplier, modification*)

3.31 monitoring: The checking of system components to detect a failure of a component, subassembly or module that affects the performance of the safety-related functions.

3.32 normal stop command: A command that initiates an action(s) to stop motion(s) or situation(s) at the end of a press cycle or at other points required by the press functions.

3.33 operator: An individual who performs production work and controls an extrusion press.

3.34 personnel: An individual(s) who is employed by or on behalf of the user.

3.35 pinch point: An area, excluding the point of operation, that poses a hazard by exposure to moving parts of the press, its related machines or equipment or the material or workpieces.

3.36 point-of-operation: The location in the press where material or a workpiece is positioned and work is performed.

3.37 presence sensing device: A device designed, constructed and arranged to create a sensing field, area or plane that will detect the presence of an individual's body.

3.38 press control: Sensors, manual input and mode selection elements, interlocking and decision making circuitry and output elements to the press operation devices and mechanisms.

3.39 pump: A device to move or compress fluids.

3.40 rebuilder: Any supplier that restores a press to its original design, capacity, purpose, and function. (See also, *supplier*)

3.41 rebuilding: Restoring the press to its original design, purpose, capacity, or function.

NOTE - Rebuilding involves the restoration or replacement of major components of the press and is not considered a maintenance or repair activity.

3.42 redundancy: The use of multiple means to perform the same function.

3.43 safeguarding: Methods for protection of personnel from hazards using guards, protective devices or safe work procedures.

E3.33 Some extrusion presses require additional personnel for their operation other than the operator.

E3.34 Personnel includes subcontractors, consultants, or other contract workers under the indirect control of the supplier or user.

E3.36 For the purposes of this standard, the point of operation is always within the confining container and, under normal conditions, the container guards the point of operation.

STANDARD REQUIREMENTS**EXPLANATORY INFORMATION**

3.44 safety-related function: That portion of the control system or safeguarding device that eliminates exposure to a hazardous situation or reduces risk to a tolerable level.

3.45 semi-automatic: Requires one or more control actions by the operator per press cycle.

3.46 shell: The outer billet skin remnant.

3.47 supplier: An individual, corporation, partnership or other legal entity or form of business.

NOTE - For the purposes of this standard, a supplier provides, or makes available for use, all or part of the press. When the user provides any of the above services, the user is considered the supplier.

3.48 user: An entity that utilizes presses.

NOTE - When the user manufactures, installs, modifies, rebuilds or integrates the press, the user is considered the supplier.

3.49 valve: A device to control the flow or pressure of a gas or liquid.

E3.47 A supplier can be the manufacturer, manufacturer's agent, representative or distributor, reseller, installer, modifier, rebuilder or integrator who provides equipment or services for the press.

4 Responsibility

4.1 Supplier's responsibility

4.1.1 The supplier shall be responsible to design and construct the press in accordance with applicable requirements of clauses 5, 6, and 8 of this standard.

E4.1.1 The supplier should refer to clause 2 for applicable standards relative to the product or service provided by that supplier. When safety standards are not provided, safeguarding techniques used on similar equipment should be applied to this type of equipment, where applicable.

4.1.2 When the user, modifier or integrator designs, constructs or modifies the press, the user, modifier or integrator is considered to be the supplier of that portion so designed, constructed or modified.

4.1.3 The supplier shall:

- a) identify the sources of hazards (see 5.1);
- b) eliminate or provide the means for controlling the identified hazards by implementing a risk assessment/risk reduction strategy (see 5.2);
- c) equip each press with safeguards (e.g., guards, protective devices) or awareness barriers/devices as appropriate (see clauses 6 and 8);
- d) provide means of isolating or dissipating stored energy associated with the press (see 6.7 and 6.8);

E4.1.3 The supplier should consult with the user as to any additional hazards that should be considered as part of the hazard control strategy.