

ANSI B11.4–2003

American National Standard for Machine Tools –
Safety requirements for Shears

Secretariat and Accredited Standards Developer:

AMT – The Association For Manufacturing Technology
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McLean, VA 22102

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by the American National Standards Institute, Inc.



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Foreword

(This Foreword is not part of the requirements of American National Standard B11.4–2003.)

The primary objective of this standard is to eliminate or control the risk of injuries to personnel associated with shears by establishing requirements for the machine's construction, care and use and for the production systems in which shears are used. To accomplish this objective, responsibilities have been assigned to the builder, user, modifier, rebuilder and system integrator, as well as to the employer and the employee in the working environment.

Point-of-operation safeguarding is the single most important factor in the elimination of point-of-operation injuries. A production system consists of the shear as one component, feeding methods (including part or scrap removal) as a second component, and the third component, point-of-operation safeguarding. The vital third component, point-of-operation safeguarding, can be evaluated for effectiveness only after the first two components and operator involvement is known. Since this information is known and controlled by the employer, the responsibility for compliance with clause 6 has been assigned accordingly.

The safeguarding of production systems in shearing operations is complicated by the wide variety of operations and operating conditions, the variations in size, speed, and type of shear used; the size, thickness, and kind of pieces to be worked; the required accuracy of the finished work; the skill of operators; the length of run; and the method of sheet feeding and 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 devices) has been covered in this standard.

The words "safe" and "safety" are not absolutes. An element of safety is attitude. 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, job monotony, fatigue and experience are safety factors that must be considered by the employer.

To aid all parties concerned in conforming to the requirements of this standard, explanatory information has been placed in the right column, adjacent to the applicable requirements.

Shears 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.

Inquiries with respect to the application or the substantive requirements of this standard, and suggestions for its improvement, are welcomed, and should be sent to AMT – The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, Virginia 22102–4206, Attention: Safety Department.

This standard was processed and approved for submittal to ANSI by the 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 it approved this standard, the B11 Accredited Standards Committee had the following members:

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

Organizations Represented

Name of Representative(s)

	Delegate	Alternate
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Alliance of American Insurers	John Russell, PE, CSP	Keith Lessner
Aluminum Extruders Council	Jeff Dziki	Martin Bidwell
American Institute of Steel Construction	Thomas Schlafly	
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General Motors Corporation	Michael Taubitz	
Graphic & Product Identification Mfgs. Assn.	Donald Root	
Intl. Association of Machinists & Aerospace Workers	Jim Soptic	Ken Hass
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Machinery Dealers National Association	John Stencel, III	James Heppner, Jr.
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National Fluid Power Association	June VanPinsker	
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Unified Abrasives Manufacturers' Association, Bonded Division	Charles S. Conant	
U.S. Department of the Navy (NAVSEA)	Various delegates depending on the Standard	

At the time this standard was approved, the ANSI B11 ASC **B11.4 Subcommittee** had the following members who participated in the development of this revision:

Dennis Cloutier, CSP, Chairman	Peter Barroso, Jr., PE	Barroso Engineering
David Felinski, Secretary	Sam Boytor	Fox Controls
	Stan Brubaker	Liberty Mutual
	Christie Carmigiano	Precision Metalforming Assn.
	Christopher J. Cox	Deere & Co.
	Gary Dunn	Dunn Sales
	Carolyn Reifsteck	Safe-T-Sense
	Chris Soranno	Safe-T-Sense
	Barry A. Stockton	High Tech Consulting

Explanation of the format, and ANSI B11 conventions

This ANSI B11.4 – 2003 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 limiting device (e.g., backgage).

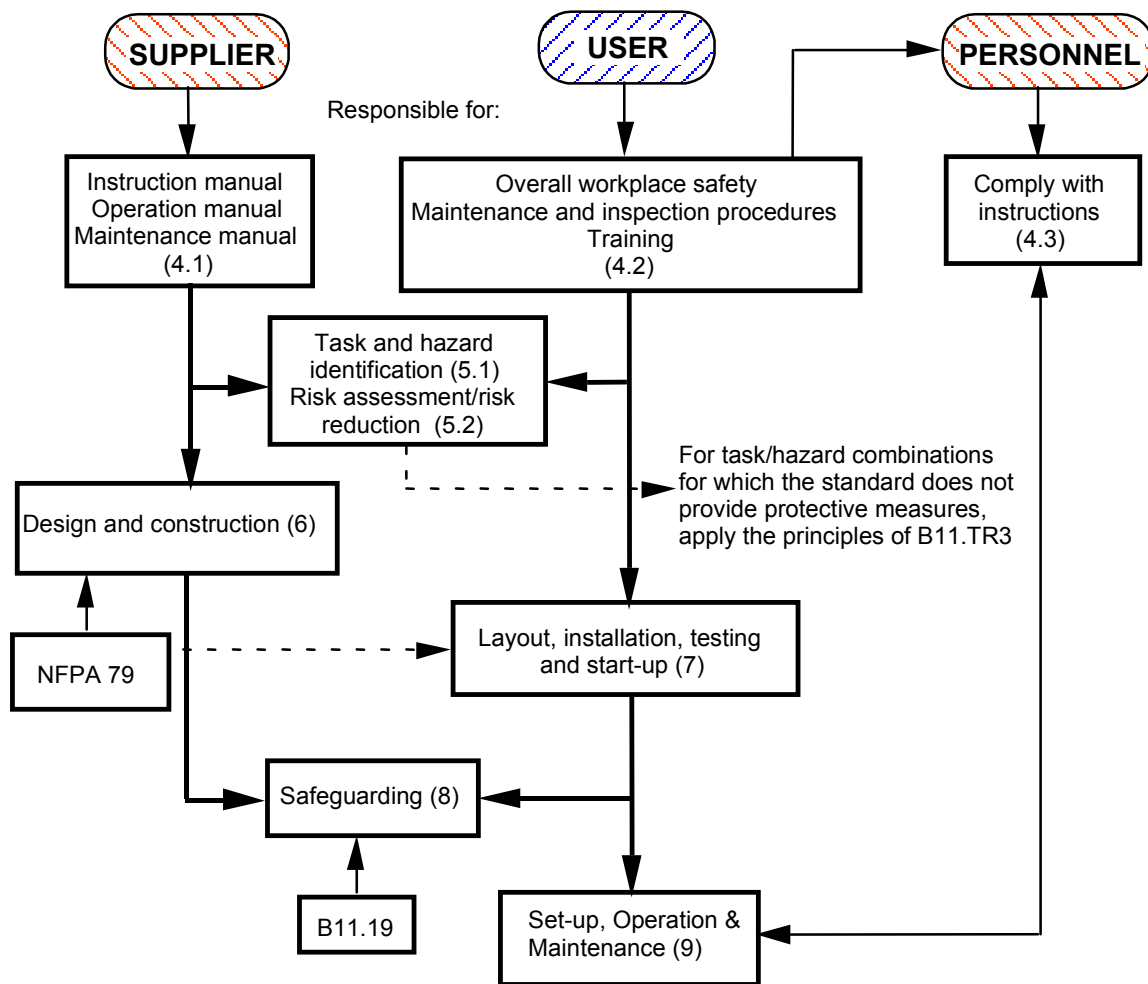
Suggestions for improvement of this standard will be welcome. They should be sent to AMT-The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, VA 22102 - Attention: B11 Secretariat.

Introduction

The primary purpose of every machine tool is to process parts. This is accomplished by the machine imparting process energy onto the workpiece. Inadvertent interference with, or accidental misdirection of the released energy during production, maintenance, commissioning and de-commissioning may result in injury.

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 for the alleviation of these risks is divided between the equipment supplier, the equipment user and its operating personnel, as follows (numbers in parentheses refer to the clause numbers in these standards which address that responsibility):



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STANDARD REQUIREMENTS

EXPLANATORY INFORMATION

American National Standard for Machine Tools –

Safety Requirements for Shears

STANDARD REQUIREMENTS

EXPLANATORY INFORMATION

(Not part of the requirements of this American National Standard for Machine Tools — Safety Requirements for Shears - ANSI B11.4-2003)

1 Scope

This standard applies to those mechanically, hydraulically, hydro-mechanically or pneumatically powered shears used to cut material by shearing, and which utilize a fixed blade(s) and non-rotary moving blade(s).

E1

See the following Figures in Annex B for examples of shears:

<u>Figure #</u>	<u>Description</u>
1	Mechanical power shear, underdrive type
2	Mechanical power shear overdrive type
3	Hydraulic power shear
4	Pneumatic powered shear
5	Manually powered shear
6	Right angle shear
7	Crop shear

Shears addressed in this standard are commonly found in these basic applications:

1) stand-alone

1) Stand-alone shears are those single units in which each stroke is activated by some action of the operator. This may include initiation of a foot or hand control or feeding a sheet until it contacts a probe or other stroke initiating device.

2) stand-alone, automatic

2) Stand-alone, automatic shears include those single units with fully automatic sheet feeder and/or positioning systems in which, once started, a continuous series of cuts are made without operator intervention.

3) process line

3) Process line shears include those machines which have been integrated into an automated system including a number of processes. Cycling of the shear stroking mechanism is a slave to the system control. Examples would be coil cut-to-length lines, coil slitting lines with crop shears (ANSI B11.18), or manufacturing systems (ANSI B11.20).

For the purpose of this standard, the term shear shall be inclusive of stand-alone, stand-alone automatic, and process line shears.

STANDARD REQUIREMENTS

EXPLANATORY INFORMATION

1.1 Specific shear types included

Shears included in this standard are the following:

- a) squaring;
- b) crop shears ;
- c) gap;
- d) right angle;

- e) plate;
- f) gate;
- g) pivot blade (swing beam);
- h) slitting – non-rotary;
- i) cut-to-length;
- j) guillotine.

d) Right angle shears may have a knife arrangement which changes rake angle during the shearing cycle and these are also included in this standard.

j) Special consideration should be given to applying the safeguarding requirements of this standard to guillotine shears used in the scrap metal industry due to the unique hazards associated with processing of non-flat or irregular-shaped material.

1.2 Specific shear types excluded

Specific shear types excluded are the following:

- a) slitting-rotary;
- b) nibblers;
- c) coil slitters;
- d) portable hand tools
- e) rotary-blade slitters and shears;
- f) iron workers;
- g) angle, bar, beam, channel and notching machines;
- h) alligator shears;
- i) rotary drum shears;
- j) manually powered shears.

E1.2

The shears excluded do not have one fixed and one moving non-rotary blade and do not utilize a constant rake for any one shearing stroke.

j) Manually powered shears are commonly known as jump shears (see Annex B, Figure 5).

2 Normative references

The following normative documents 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.

E2 Informative references

All normative documents are subject to revision and users of this standard are encouraged to investigate applying the most recent revisions of the normative documents listed in clause 2.

The documents (in this column below) are listed for information only, and are not essential for the completion of the requirements of this standard:

ANSI B11.19-2003, *Safety Requirements for Safeguarding*

ANSI B11.14-1996, (Safety Requirements for) *Coil Slitting Machines*

ANSI / IESNA RP7-2001, *Practice for Industrial Lighting*.

ANSI B11.18-1997, (Safety Requirements for) *Coil Processing Systems*

STANDARD REQUIREMENTS

EXPLANATORY INFORMATION

ANSI / NFPA 79-2002, *Electrical standard for industrial machinery*

ANSI / NFPA / JIC T2.24.1— *Hydraulic Fluid Power – Systems standard for stationary industrial machinery*. First edition: 10 May 1990.

ANSI / NFPA 70E-2000, *Electrical safety requirements for employee workplaces*

ANSI Z535.1-2002, *Safety Colors*

ANSI / NFPA 70-2002, *National electrical code*

ANSI Z535.2-2002, *Safety Signs*

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

ANSI Z535.3-2002, *Criteria for Safety Symbols*

ANSI / ASME Boiler & Pressure Vessel Code, 2001, Division 1, Section VIII.

ANSI Z535.4-2002, *Product Safety Signs and Labels*

ANSI Z535.5-2002, *Safety Tags and Barricade Tapes (for Temporary Hazards)*

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

29 CFR 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*. For more information, go to www.osha.gov

29 CFR 1910.333 b(2), *Selection and Use of Electrical Work Practices*. For more information, go to www.osha.gov

29 CFR 1910.219, *Mechanical Power-Transmission Apparatus*. For more information, go to www.osha.gov

3 Definitions

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

3.1 auxiliary equipment: Additional or supplemental equipment or devices operating in association with the shear or shear production system.

E3.1 Auxiliary equipment can include such devices as material feeding and removal components, safeguarding, material support systems and vision systems.

3.2 awareness barrier: An attachment that, by physical contact or visual notice, warns personnel of a present or approaching hazard.

E3.2 See *protective measures*.

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

E3.3 See *protective measures*.