

ANSI B11.15-2001

# American National Standard

*Safety Requirements for  
Pipe, Tube, and Shape Bending Machines*

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**American National Standards Institute**  
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**Designation**

**Approved American National Standards**

**ANSI-**

B11.1-2001		<i>Safety Requirements for Mechanical Power Presses</i>
B11.2-1995	(R2000)*	<i>Hydraulic Power Presses – Safety Requirements for Construction, Care and Use</i>
B11.3-2002		<i>Safety Requirements for Power Press Brakes</i>
B11.4-1993		<i>Shears – Safety Requirements for Construction, Care and Use</i>
B11.5-1988	(R1994)*	<i>Iron Workers – Safety Requirements for Construction, Care and Use</i>
B11.6-2001		<i>Safety Requirements for Manual Turning Machines with or without Automatic Control</i>
B11.7-1995	(R2000)*	<i>Cold Headers and Cold Formers – Safety Requirements for Construction, Care and Use</i>
B11.8-2001		<i>Safety Requirements for Drilling, Milling, and Boring Machines</i>
B11.9-1975	(R1997)*	<i>Grinding Machines – Safety Requirements for Construction, Care and Use</i>
B11.10-1990	(R1998)*	<i>Metal Sawing Machines – Safety Requirements for Construction, Care and Use</i>
B11.11-2001		<i>Safety Requirements for Gear &amp; Spline Cutting Machines</i>
B11.12-1996		<i>Roll Forming and Roll Bending Machines – Safety Requirements for Construction, Care and Use</i>
B11.13-1992	(R1998)*	<i>Single- and Multiple-Spindle Automatic Screw/Bar and Chucking Machines – Safety Requirements for Construction, Care and Use</i>
B11.14-1996		<i>Coil Slitting Machines/Systems – Safety Requirements for Construction, Care and Use</i>
B11.15-2001		<i>Safety Requirements for Pipe, Tube, and Shape Bending Machines</i>
B11.16-1988		<i>Metal Powder Compacting Presses – Safety Requirements for Construction, Care and Use (WITHDRAWN)</i>
B11.17-1996		<i>Horizontal Hydraulic Extrusion Presses – Safety Requirements for Construction, Care and Use</i>
B11.18-1997		<i>Machinery and Machine Systems for the Processing of Strip, Sheet, or Plate from Coiled Configurations – Safety Requirements for Construction, Care and Use</i>
B11.19-1990	(R1997)*	<i>Performance Criteria for the Design, Construction, Care and Operation of Safeguarding when Referenced by the other B11 Machine Safety Standards</i>
B11.20-1991	(R1997)*	<i>Manufacturing Systems/Cells – Safety Requirements for Construction, Care and Use</i>
B11.21-1997		<i>Machine Tools Using Lasers for Processing Materials – Safety Requirements for Construction, Care and Use</i>

**ANSI-**

**Registered Technical Reports**

B11.TR1-1993		<i>Ergonomic Guidelines for the Design, Installation and Use of Machine Tools</i>
B11.TR2-1997		<i>Mist Control Considerations for the Design, Installation and Use of Machine Tools Using MetalWorking Fluids</i>
B11.TR3-2000		<i>Risk Assessment and Risk Reduction – A Guide to Estimate, Evaluate and Reduce Risks Associated With Machine Tools</i>

\* = Standard that has been reaffirmed by the ANSI B11 Accredited Standards Committee, and the year of reaffirmation. The date next to the standard designation is its last revision.

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**ANSI B11.15-2001**

*American National Standard for Machine Tools –*

***Safety Requirements for  
Pipe, Tube, and Shape Bending Machines***

Secretariat and Accredited Standards Developer:

**AMT-The Association For Manufacturing Technology  
7901 Westpark Drive  
McLean, VA 22102**

**Approved: DECEMBER 21, 2001**

**by the American National Standards Institute**

## American National Standard

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## Foreword

(This Foreword is not part of the requirements of American National Standard B11.15-2001)

The primary objective of this standard is to eliminate or control the risk of injuries to personnel associated with pipe tube and shape bending machines by establishing requirements for the machine's construction, operation and maintenance and for the production systems in which pipe, tube and shape bending machines are used. To accomplish this objective, responsibilities have been assigned to the supplier (manufacturer, rebuilder, reconstructor, and user) as well as to personnel 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 pipe, tube or shape bender 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.

The safeguarding of production systems in pipe, tube and shape bending operations is complicated by the wide variety of operations and operating conditions, the variations in size, speed, and type of pipe, tube and shape bending machine 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 tube or shape 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) have been covered in this standard.

The words "safe" and "safety" are not absolutes. Safety begins with good design. While the goal of this standard is to eliminate injuries, it is recognized that risk factors cannot possibly 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, ergonomic factors, fatigue and experience are safety factors that must be considered by the user.

Pipe, tube and shape bending machines, and associated equipment technologies are continuously evolving. This standard is reflective of 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 the AMT - The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, Virginia 22102-4206, Attention: Safety Department.

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 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. Kopps, Vice-Chairman  
 David A. Felinski, Secretary

**Organizations Represented**

**Name of Representative(s)**

	<b>Delegate</b>	<b>Alternate</b>
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Alliance of American Insurers	John Russell, PE, CSP	Keith Lessner
Aluminum Extruders Council	Jeff Dziki	Martin Bidwell
American Insurance Service Group	Henry S. Pankiw	Paul Frenier
American Institute of Steel Construction	Thomas Schlafly	
American Society of Safety Engineers	Bruce Main, PE, CSP	George Karosas, PE, CSP
Association For Manufacturing Technology	Russell Bensman	
Can Manufacturers Institute	Geoff Cullen	
Deere and Company	Gary D. Kopps	Ellen K. Blanshan
Forging Industry Association	John W. Commet	Karen Taylor
General Motors Corporation	Michael Taubitz	
Graphic & Product Identification Mfgs. Assn.	Donald Root	
International Association of Machinists & Aerospace Workers, District Lodge 142	Jim Soptic	Ken Hass
Intl. Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)	Jim Howe, CSP	Luiz Vazquez
Machinery Dealers National Association	John Stencel, III	James Heppner, Jr.
Metal Building Manufacturers Association	Charles M. Stockinger	Charles E. Praeger
Metal Powder Industries Federation	Dennis Cloutier, CSP	Donald White
National Electrical Manufacturers Association	Vincent Baclawski	Frank Kitzantides
National Fluid Power Association	June VanPinsker	
National Tooling and Machining Association	Andy Levine	Richard R. Walker
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Sheet Metal and Air Conditioning Contractors' National Association	James T. Strother	Tom J. Meighen
Steel Service Center Institute	Bob Carragher	Nicole LaPorte
Tooling and Manufacturing Association	Jeffery W. Hayes	Bruce C. Braker
Unified Abrasives Manufacturers' Association, Bonded Division	Charles S. Conant	
U.S. Department of the Navy (NAVSEA)	William C. Thacker	William Clark

At the time this standard was approved, the ANSI B11 ASC **B11.15 Subcommittee** had the following members who participated in the development of this revision:

Robert Grice, Chairman	Creation Windows
Thomas Glissman, Secretary	Pines Manufacturing
Robert Eggleston	Drion Safety Service, Inc. (Previously with G.E. Aircraft Engines)
Joseph Kelly	(Previously with Allegheny Teledyne Industries; past Chairman of the B11.15 Subcommittee)



## **Explanation of the format of the standard**

This ANSI B11.15 – 2001 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 felt would clarify the standard. This column should not be construed as being a part of the requirements of this American National Standard.

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.

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 casual, and the term “MAY” denotes a permissible course of action within the limits of the standard.

By convention, 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*.

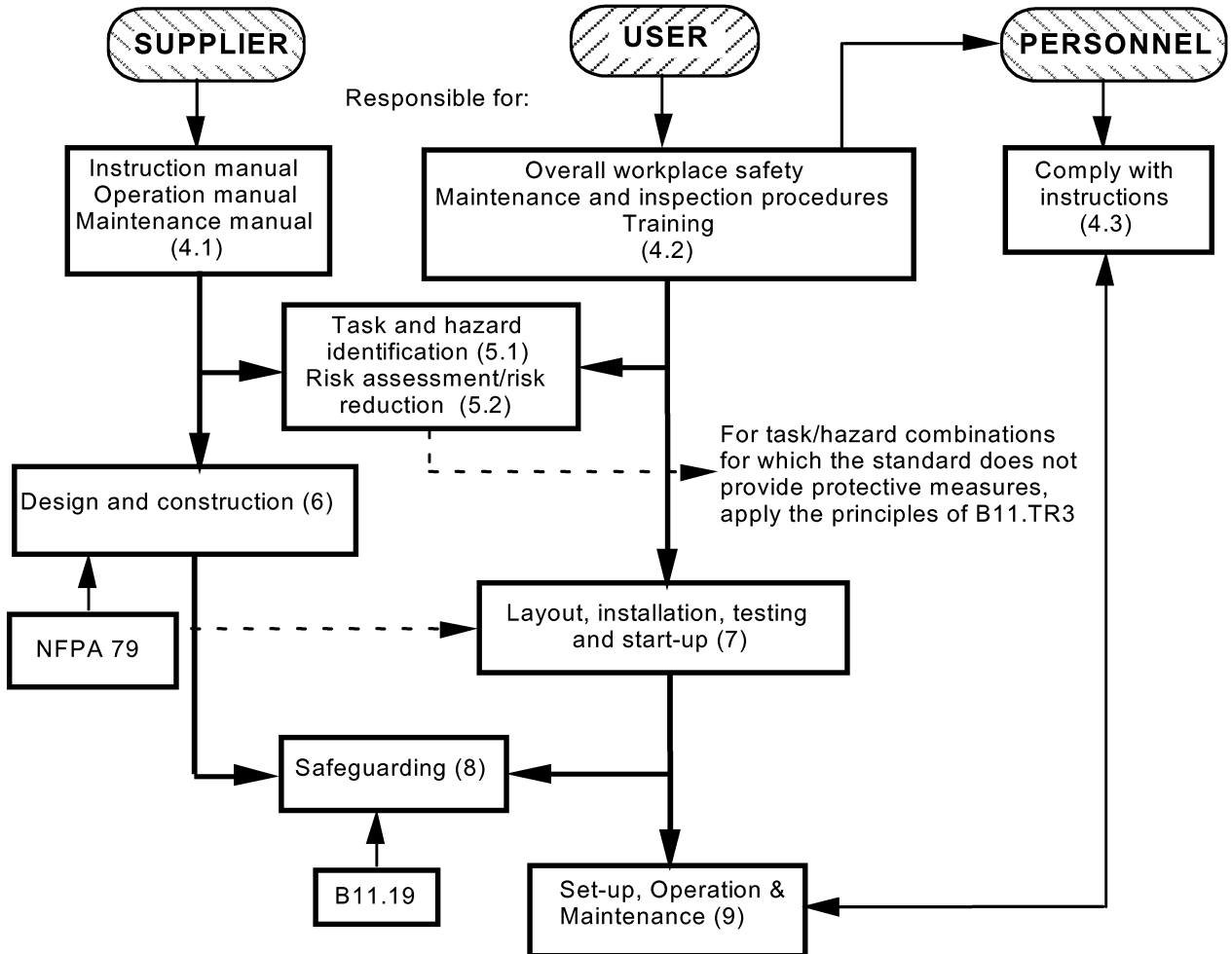
Suggestions for improvement of this standard will be welcome. They should be sent to AMT-The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, VA 22102 - Attention: B11 Secretariat.

## 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 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 or 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, its user and its operating personnel, as follows (numbers in parentheses refer to the clause numbers in these standards which address that responsibility):



*American National Standard for Machine Tools –  
Safety Requirements for  
Pipe, Tube, and Shape Bending Machines –*

**1 Scope**

**E1**

The requirements of this standard apply to any power-driven machine designed for bending pipe, tube, and shapes by means of bending dies, clamp dies, pressure dies, mandrels, wiper dies, vertical bending punches, radius dies, wing dies, and associated tooling.

For examples of bending applications, see Figure 1.

NOTE - In the context of this standard, machine refers to pipe, tube, and shape bending machines.

**1.1 Applications**

The requirements of this standard apply to:

- Vertical hydraulic benders;
- Horizontal hydraulic benders;
- Horizontal mechanical benders;
- Horizontal or vertical combination hydraulic and mechanical benders and combination pneumatic and mechanical benders;
- Compression benders;
- Draw benders;
- Pipe benders;
- Stretch benders;
- Tube benders.

**1.2 Exclusions**

The requirements of this standard do not apply to:

- Bench presses;
- Hydro forming;
- Forging presses;
- Four-slide machines;
- Hydraulic presses;
- Mechanical presses;
- Power press brakes;
- Roll benders;
- Roll formers;
- Assembly machines.

**1.3 Descriptions**

**E1.3**

Examples of bending machines are shown in