

# ANSI B11.10–2003 (R09)

*American National Standard for Machine Tools –*

## *Safety Requirements for Metal Sawing Machines*

Secretariat and Accredited Standards Developing Organization:

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

**Approved: August 26, 2003**  
**Reaffirmed: September 9, 2009**

by the American National Standards Institute, Inc.





## 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 AMT – The Association For Manufacturing Technology (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 AMT 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 (AMT).

AMT 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. AMT 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. AMT does not undertake to guarantee the performance of any individual manufacturer 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 AMT 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, AMT is not undertaking to render professional or other services for or on behalf of any person or entity, nor is AMT 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.

AMT has no power, nor does it undertake to police or enforce conformance to the requirements of this document. AMT 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 AMT 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: AMT – The Association For Manufacturing Technology  
7901 Westpark Drive, McLean, VA 22102-4269, USA

**Copyright © 2003** by the Association For Manufacturing Technology  
**All rights reserved.** Printed in the United States of America

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Table of Contents	Page
<b>FOREWORD .....</b>	<b>IV</b>
<b>EXPLANATION OF THE FORMAT OF THIS STANDARD, AND ANSI B11 CONVENTIONS.....</b>	<b>VI</b>
<b>INTRODUCTION.....</b>	<b>VII</b>
<b>1 SCOPE.....</b>	<b>1</b>
1.1 GENERAL .....	1
1.2 SAWING MACHINES INCLUDED .....	1
1.3 SAWING MACHINES EXCLUDED .....	6
<b>2 NORMATIVE REFERENCES .....</b>	<b>7</b>
<b>3 DEFINITIONS.....</b>	<b>8</b>
<b>4 RESPONSIBILITY .....</b>	<b>10</b>
4.1 SUPPLIER'S RESPONSIBILITY .....	10
4.2 USER'S RESPONSIBILITY .....	11
4.3 PERSONNEL RESPONSIBILITY .....	11
<b>5 HAZARD CONTROL.....</b>	<b>12</b>
5.1 TASK AND HAZARD IDENTIFICATION.....	12
5.2 RISK ASSESSMENT / RISK REDUCTION .....	13
<b>6 DESIGN AND CONSTRUCTION.....</b>	<b>14</b>
6.1 GENERAL .....	14
6.2 COMPONENT SELECTION .....	14
6.3 MACHINE CONTROLS .....	14
6.4 DESCRIPTION OF MODES OF OPERATION .....	14
6.5 ELECTRICAL EQUIPMENT .....	14
6.6 HYDRAULIC AND PNEUMATIC SYSTEMS .....	15
6.7 EXTERNAL POWER SOURCES.....	16
6.8 STORED ENERGY.....	16
6.9 EXTERNAL INTERFERENCES.....	17
6.10 PERFORMANCE OF THE SAFETY-RELATED FUNCTION(S) .....	17
6.11 MACHINE STARTING.....	17
6.12 STOP AND EMERGENCY STOP CONTROLS .....	17
6.13 OPERATOR CONTROL STATIONS .....	17
6.14 MANUALLY OPERATED CONTROL DEVICES .....	18
6.15 AWARENESS SIGNALS .....	18
6.16 ANTI-MOTION MECHANISMS OR COUNTER-BALANCE ON SLIDE MECHANISMS.....	19
6.17 POWER-OPERATED WORKHOLDING.....	19
6.18 COOLANT SYSTEMS .....	19
6.19 BLADE MOUNTING AND RETENTION .....	20
6.20 ELIMINATION OF, OR PROTECTION FROM, INHERENT HAZARDS.....	21
6.21 WORK ZONES.....	22
6.22 POWER-OPERATED WORKPIECE FEEDING DEVICES .....	23
6.23 CHIP COLLECTION/REMOVAL .....	23
6.24 STRUCTURAL INTEGRITY .....	23
6.25 NOISE.....	23
6.26 ERGONOMIC CONSIDERATIONS .....	23
6.27 ENERGY SUPPLY FAILURES.....	24
6.28 ERRORS OF FITTING .....	24
6.29 LIFTING OF MACHINE COMPONENTS .....	24
6.30 DOCUMENTATION REQUIREMENTS .....	24

<b>7</b>	<b>LAYOUT, INSTALLATION, TESTING AND START-UP .....</b>	<b>25</b>
7.1	GENERAL.....	25
7.2	LAYOUT AND INSTALLATION.....	25
7.3	TESTING AND START-UP.....	26
<b>8</b>	<b>SAFEGUARDING .....</b>	<b>26</b>
8.1	GENERAL.....	26
8.2	GUARDS.....	26
8.3	PROTECTIVE DEVICES.....	27
8.4	AWARENESS DEVICES.....	28
8.5	SAFEGUARDING AGAINST SPECIFIC HAZARDS .....	28
8.6	SAFE WORK PROCEDURES.....	28
8.7	PERFORMANCE OF THE SAFETY-RELATED FUNCTION(S).....	28
<b>9</b>	<b>SET-UP, OPERATION AND MAINTENANCE .....</b>	<b>29</b>
9.1	GENERAL.....	29
9.2	MACHINE SET-UP PROCEDURES.....	29
9.3	SAFEGUARDING.....	29
9.4	MAINTENANCE .....	30
9.5	PERSONAL PROTECTIVE EQUIPMENT.....	31
9.6	TRAINING .....	31
9.7	SUPERVISION .....	32
9.8	MACHINE OPERATION.....	32
	<b>ANNEX A – LIST OF SIGNIFICANT HAZARDS AND MAJOR SOURCES OF THESE HAZARDS .....</b>	<b>33</b>
	<b>ANNEX B – PERFORMANCE OF THE SAFETY-RELATED FUNCTION(S) .....</b>	<b>36</b>

## Foreword (This foreword is not part of the requirements of American National Standard B11.10-2003)

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

Metal sawing machines 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.

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 be practically 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 user.

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 22102-4269, 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 prepared by the B11.10 Subcommittee, 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**

Aerospace Industries Association of America  
Alliance of American Insurers  
American Institute of Steel Construction  
American Society of Safety Engineers  
Association For Manufacturing Technology  
Automotive Industry Action Group  
Can Manufacturers Institute  
General Motors Corporation  
John Deere

Metal Building Manufacturers Association  
Metal Powder Industries Federation

### **Name of Representative(s)**

#### **Delegate**

Willard J. Wood, ARM  
John Russell, PE, CSP  
Thomas Schlafly  
Bruce Main, PE, CSP  
Russell Bensman  
Ron Tillinger  
Geoffrey Cullen  
Michael Taubitz  
Gary D. Kopps

#### **Alternate**

Robert J. Eaker, PE, CSP  
Keith Lessner  
George Karosas, PE, CSP  
Ellen K. Blanshan

Charles M. Stockinger  
Dennis Cloutier, CSP  
Charles E. Praeger

AMERICAN NATIONAL STANDARD

B11.10-2003

National Institute for Occupational Safety & Health	John Etherton	
Occupational Safety & Health Administration	Ken Stevanus	
Packaging Machinery Manufacturers Institute	Charles F. Hayes	
Precision Metalforming Association	Christopher E. Howell	Christie Carmigiano
Presence Sensing Device Manufacturers Association	Jim Kirton	Barry Stockton
Robotic Industries Association	Jeff Fryman	Nicholas Dagalakis
Scientific Technologies, Inc.	Frank Webster	Chris Soranno
Sheet Metal and Air Conditioning Contractors' National Association	Mike McCullion	
Tooling and Manufacturing Association	Daniel Kiraly	Jeffery W. Hayes
Toyota Motor Manufacturing North America	Barry Boggs	Tom Huff

At the time this standard was approved, the ANSI B11 ASC **B11.10 Subcommittee** had the following members who participated in the development of this revision:

Jim Cunningham, Chairman	John Bloodgood, PE	JFB Enterprises
Armstrong - Blum	Tony Bratkovich, PE	AMT
David Felinski, Secretary	Dennis Cloutier, CSP	Cloutier Consulting
	Bill Everett	Everett Industries
	Ken Forman	MetlSaw
	Gerald Harris	HEM Saws
	John Heltzel	Scotchman Industries
	Al Karvelis, PhD	Packer Engineering
	Bob Klingerman	Savage Saws
	Lanny Landale	Dake
	Bruce Main, PE	design safety engineering
	Eric Offerdahl, CSP	Aegis Safety Consulting
	Pat Whitehead	Hyd Mechanical Group

## Explanation of the format of this standard, and ANSI B11 conventions

This ANSI B11.10 – 2003 American National Standard is divided into parts formerly referred to as sections or chapters and now referred to as clauses in line with the new 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 this American National 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., backage).

As in all American National Standards, the term "SHALL" denotes a requirement that is to be strictly followed in order to conform with 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.

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.

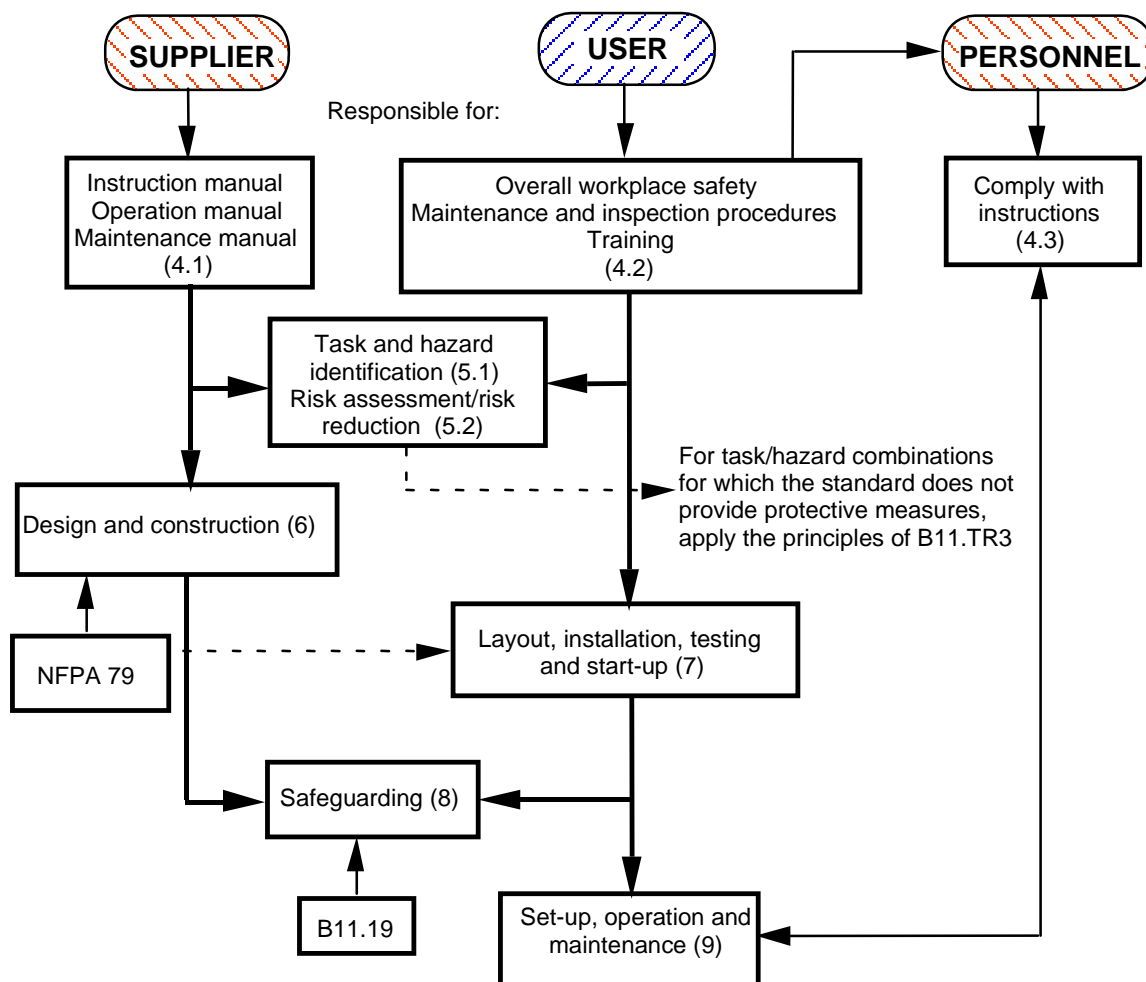


## Introduction

The primary purpose of every machine tool is to process parts. This is accomplished by the machine imparting process energy onto the workpiece. It is during this interaction between the machine and the workpiece where inadvertent interference with, or accidental misdirection of the released process energy can potentially cause injury. Hazards exist that may result in injury during production, maintenance, commissioning and de-commissioning.

The purpose of the ANSI B11 series machine tool safety standards is to devise and propose ways to minimize risks of the potential safety 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 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):





*American National Standard for Machine Tools –*  
***Safety Requirements for Metal Sawing Machines***  
***with or without Automatic Control***

**STANDARDS REQUIREMENTS**

**EXPLANATORY INFORMATION**

(Not part of the requirements of this American National Standard for Machine Tools – Safety requirements for Metal Sawing Machines (ANSI B11.10 – 2003))

**1 Scope**

**1.1 General**

This American National Standard specifies safety requirements for the design, construction, modification, operation and maintenance (including installation, dismantling and transport) of a general class of stationary machine tools that use a saw blade (tool) to cut off or change the shape of the workpiece.

This standard also applies to ancillary devices integrated into the machine (e.g., part handling mechanisms, chip handling systems).

**1.2 Sawing machines included**

Sawing machines included in this standard use toothed blades and include circular saws, bandsaws and hacksaws.

**1.2.1 General description**

Machines of this general class are capable of moving a saw blade across a workpiece surface, causing a cutting action and relative feeding motion between blade and workpiece, as metal is removed in such a manner as to cause the workpiece to be parted, slotted, or to change its shape.

NOTE – Friction cutting of metal could be performed with most of the described types of band and circular metal sawing machines and is part of this standard.

**1.2.2 Band sawing machines**

Sawing machines of this general class utilize a band saw blade traveling over the rims or periphery of two or more band wheels, one or more of which is power driven, and produce a cutting action on a workpiece by applying the cutting edge of the band saw blade to the workpiece.

**1.2.2.1 Horizontal band saw**

A sawing machine of this class consists of a head assembly that carries the band wheels and the band saw blade, and is mounted on a work support table. Cutting action is produced by a downward motion of the head and is in a vertical plane, owing to twisting of the band saw blade through guides.

**E1.1**

NOTE - For purposes of this standard, the terms *machine* and *machine tool* refer to metal sawing machines.

**E1.2**

These sawing machines include a variety of configurations, e.g., horizontal, vertical, chop, swing and angular.