

ANSI B11.23–2002 (R2020)

American National Standard

Safety Requirements for Machining Centers and Automatic, Numerically Controlled Milling, Drilling and Boring Machines

ANSI-Accredited Standards Developer and Secretariat:



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APPROVED: 1(>i bY 200&

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by the American National Standards Institute
Board of Standards Review



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Foreword (This Foreword is not part of the requirements of American National Standard B11.23-2002 (R2020))

The primary objective of this standard is to eliminate or control hazards to personnel associated with machining centers and automatic numerically controlled milling, drilling and boring 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, reconstructor, installer, integrator), the user, and personnel in the working environment.

This standard began development in the late 1990's after recognition of the need for a safety standard to address the supplier and user needs involving these machines, and approved by ANSI in 2002. This American National Standard was reaffirmed by ANSI in 2007, 2012 and again in 2020.

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.

Machining centers and automatic numerically controlled milling, drilling and boring 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.

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 for new machines within 30 months of the approval of this standard.

For existing or modified machines, this Subcommittee recommends that users should confirm that the equipment / process has tolerable risk using generally recognized risk assessment methods within 30 months of the approval date of this standard. 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.

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 B11 Standards, Inc. – POB 690905, Houston, TX 77269-09054206, Attention: B11 Secretariat.

This standard was prepared by the B11.23 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 reaffirmed as an American National Standard, the ANSI B11 Accredited Standards Committee was composed of the following member organizations:

Alan Metelsky, PE, Chairman
Barry Boggs, Vice-Chairman
David A. Felinski, Secretary

Organizations Represented	Name of Representative	
	Delegate	Alternate
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Aluminum Extruders Council	Melvin Mitchell	Scott Burkett
American Society of Safety Engineers	Bruce Main, PE, CSP	George Karosas, PE, CSP
Association For Manufacturing Technology	Russell Bensman	Alan Metelsky
The Boeing Company	Don Nelson	Lance Chandler, PE
Canadian Standards Association	Elizabeth Rankin, CRSP	Walter Veugen
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Komatsu America Industries	George Schreck	James Landowski
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National Institute for Occupational Safety & Health	Richard Current, PE	James Harris, PhD, PE
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Property Casualty Insurers	Stanford Brubaker	John Russell, PE, CSP
Robotic Industries Association	Jeffrey Fryman	Claude Dinsmoor
Rockwell Automation	Patrick Barry	Michael Miller
Safe-T-Sense	Samuel Boytor	Mark Witherspoon
Sheet Metal & Air Conditioning Contractors Nat'l. Assn.	Michael McCullion	Roy Brown
System Safety Society	John Etherton, PhD, CSP	Rod Simmons, PhD
Toyota Motor Manufacturing North America	Barry Boggs	Todd Mills
International United Automotive Workers	Tom Ford	

At the time this standard was approved, the ANSI B11 ASC **B11.23 Subcommittee** had the following members who participated in the development of this standard:

Name	Company	Title
Miles Loretta	Cincinnati-Milacron	Chairman
John F. Bloodgood, PE	JFB Enterprises	Secretary
Anthony M. Bratkovich, PE	AMT	Administrator
Lance Chandler	Boeing	
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Robert Garcia	Caterpillar	
Kent Johnson	Deere	
Mark Perriello	Westinghouse	
Mark Reitzel	Cellular Concepts	
William E. Riley	U.S. Navy	
Mark Vetty	Okuma	

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

This ANSI B11.23 – 2002 (R2020) American National 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 “Standard Requirements” only, and is so captioned. The right column, captioned “Explanatory Information” contains information that the writing Subcommittee believed would help clarify 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 B11 Standards, Inc. – POB 690905, Houston, TX 77269-0905 - 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 safety standards is to devise and propose ways to minimize risks of the potential hazards. This can be accomplished by an appropriate machine design, by restricting personnel and 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 machine 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):

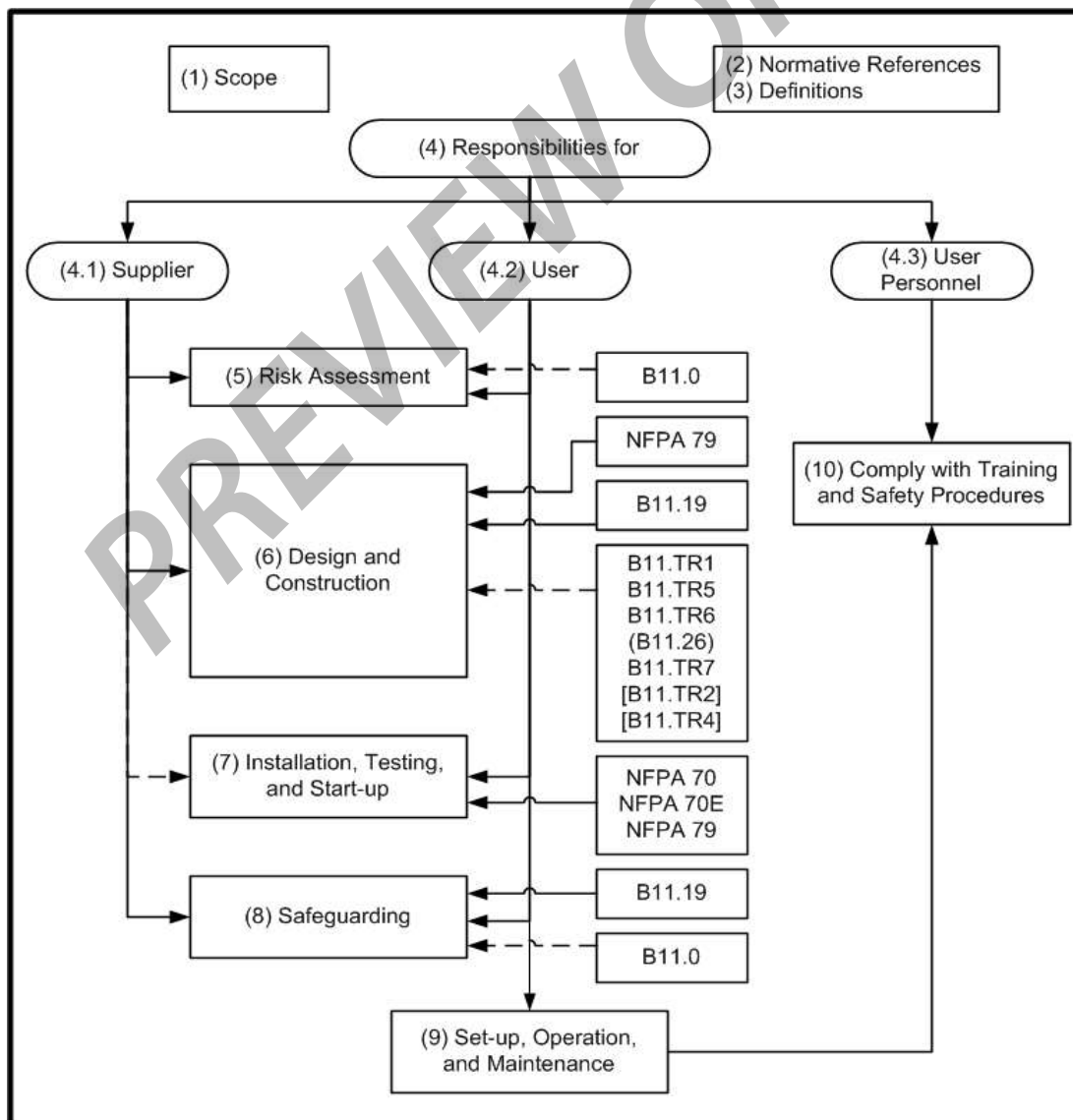


Figure 1 – Typical layout of B11 base standards showing the various responsibilities

Figure 1 (previous page) 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. 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.

Notes for Figure 1:

- 1) Scope – Provides the boundaries or limits of the standard (i.e., what is/is not included in the coverage or requirements).
- 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 in a unique or particular manner, 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) Risk assessment process – Clause 5 presents the general approach to risk assessment (see B11.0 [B11.TR3] for further explanation of hazard/task identification and risk assessment/risk reduction).
- 6) Design and construction – Generally, the supplier will be responsible for the requirements of clause 6, understanding that the user may add to or modify these requirements through the purchase agreement.
- 7) Layout, 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 between the supplier and user but often, either the supplier or the user will provide and/or meet most or even all of the requirements of clause 8.
- 9) Setup, operation and maintenance – The user is generally responsible for the requirements of clause 9, with possible assistance from the supplier for training.

*American National Standard for Machines –
Safety Requirements for Machining Centers and Automatic,
Numerically Controlled Milling, Drilling and Boring Machines*

STANDARD REQUIREMENTS**1 Scope**

This standard specifies the safety requirements for the design, construction, operation and maintenance (including installation, dismantling, and transport) of machining centers and automatic numerically controlled milling, drilling and boring machines (see 3.1).

This standard is applicable to machines where the axes of travel is not greater than 1x1x1 m (39x39x39 in.).

1.1 Machining center

A machining center is a numerically controlled machine tool with automatic tool changing capability and work support means capable of multiple functions of drilling, milling, boring or any combination of these operations normally utilizing a rotating tool. This machine operates in a continuous sequence of movements under numerical control (NC).

NOTE - The terms machine and machinery as used throughout this standard mean machining center.

2 Normative references

The following normative documents 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.

EXPLANATORY INFORMATION

(This column is not part of the requirements of this American National Standard for Machines – Safety Requirements for Machining Centers and Automatic, Numerically Controlled Milling, Drilling and Boring Machines, ANSI B11.23-2002 (R2020)).

E1

This standard is not intended to cover safety requirements of manufacturing systems/cells (see B11.20).

Larger machines may comply with this standard or use other effective means to reduce the risks associated with the identified hazards.

E1.1

A machining center can also include, but is not limited to, functions such as gaging, burnishing, grinding and machining operations that are not covered in this standard. A machining center may have one or more spindles, work stations and may include an automatic work changing means.

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 references listed in clause 2.

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