ANSI B11.22–2002 (R2012)

American National Standard for Machines –

Safety Requirements for Turning Centers and Automatic, Numerically Controlled Turning Machines

Secretariat and Accredited Standards Developer:

B11 Standards, Inc.
POB 690905
Houston, TX 77269

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American National Standards Institute

AMERICAN NATIONAL STANDARDS

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Foreword (This foreword not part of the requirements of American National Standard B11.22-2002 R2012)

The primary objective of this standard is to eliminate or control hazards to personnel associated with numerically controlled turning 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, and again in 2012.

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.

Turning centers, numerically controlled turning 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 77269-0905, Attention: B11 Secretariat.

This standard was prepared by the B11.22 Subcommittee, processed and submitted for ANSI approval by the B11 Accredited Standards Committee on Safety Standards for Machines. 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
Aerospace Industries Association of America	Willard Wood	Lisa Goldberg / Chris Carnahan
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
Deere & Co.	Gary Kopps	Scott Fowler
FDR Safety	Michael Taubitz	Flavius Brown
General Motors Corporation	Michael Douglas	
Komatsu America Industries	George Schreck	James Landowski
Metal Powder Industries Federation	Dennis R. Cloutier, CSP	Teresa Stillman
National Institute for Occupational Safety & Health	Richard Current, PE	James Harris, PhD, PE
Occupational Safety & Health Administration	Kenneth Stevanus	Robert Bell
Omron Scientific Technologies Incorporated	Frank Webster	Christopher Soranno
Packaging Machinery Manufacturers Institute	Charles Hayes	Maria Ferrante
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Presence-sensing Device Manufacturers Association	James V. Kirton	Michael Carlson
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Robotic Industries Association	Jeffrey Fryman	Claude Dinsmoor
Rockwell Automation	Patrick Barry	Michael Miller
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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 **B11.22 Subcommittee** had the following members who participated in the development of this standard:

Name	Company	Title
James Hoffman	Cincinnati Milacron	Chairman
Carl Sharak	Liberty Mutual	Secretary
Anthony M. Bratkovich, PE	AMT	Administrator
John F. Bloodgood, PE	JFB Enterprises	
James Cordier	Hardinge	
Roger Hopkins	General Motors	
Carlos Lugo	Boeing	
William E. Riley	U.S. Navy	
Larry Siefring	Monarch	
Mark D. Vetty	Okuma	
Joseph Volk	Okuma	

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

This ANSI B11.22 – 2002 (R2012) 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 felt would 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):

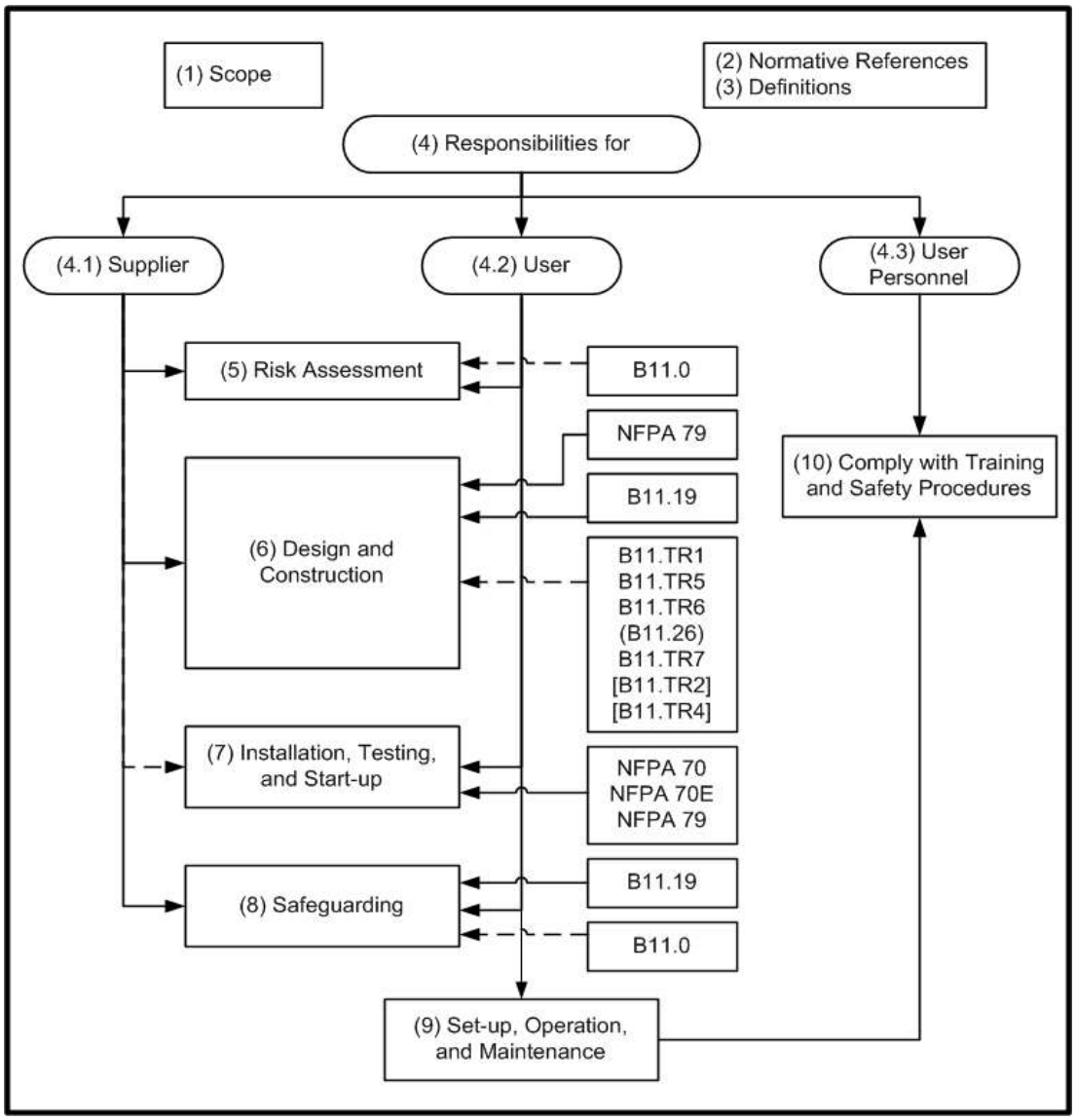

Figure 1 – Typical layout of B11 base standards showing the various responsibilities

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 Machine Tools –

Safety Requirements for Turning Centers and Automatic, Numerically Controlled Turning Machines

Standard Requirements	**Explanatory Information** (This column is not part of the requirements of this American National Standard for Machines – Safety Requirements for Turning Centers and Automatic, Numerically Controlled Turning Machines, ANSI B11.22-2002 (R2012)).
1 Scope	***E1***
This standard specifies the safety requirements for the design, construction, operation and maintenance (including installation, dismantling and transport) of turning centers and automatic, numerically controlled turning machines (see 1.1 and 1.2).	
This standard is applicable to: • automatic, numerically controlled horizontal- and vertical- spindle turning machines and turning centers which are designed to accept workholding devices up to 500 mm (20 inches) outside diameter and with distance between centers of up to 2 m (80 inches); • auxiliary equipment and components which are integral to the machine; • machines which are integrated into automatic production lines or turning cells as much as the potential hazards and associated risks are comparable to those of machines working separately.	Larger machines may comply with this standard or use other effective means to reduce the risks associated with the identified hazards. Generally, workholding chucks are not considered to be integral parts of the machine.
1.1 Turning centers These are automatic, numerically controlled turning machines with additional features such as power driven tools, the capability to orient the workholding spindle around its axis and automatic tool changing or workholding changing from a magazine.	.
1.2 Automatic, numerically controlled turning machines These are machine tools that use automatic control of a process performed by a device that makes use of numeric data introduced while the operation is in progress. The principal movement is the rotation of the workpiece against a stationary tool(s) such that the cutting force is from the workpiece and not the tool. This machine operates under numerical control (NC) or computer numerical control (CNC).	***E1.2*** A NC turning machine can also include, but is not limited to, functions such as gaging, burnishing, grinding, boring and drilling.