ANSI B11.20–2004 (R2015)

American National Standard for Machines –

Safety Requirements for Integrated Manufacturing Systems

ANSI-Accredited Standards Developer and Secretariat:

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FOREWORD (This Foreword is not part of the requirements of American National Standard B11.20-2004)

The primary objective of this standard is to eliminate or control hazards to personnel associated with integrated manufacturing systems 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.

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.

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 the B11 Standards, Inc., POB 690905, Houston Texas, 77269; 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 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 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.

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 document 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	
	Delegate	**Alternate**
Aerospace Industries Association of America	Willard J. Wood	Robert J. Eaker, PE, CSP
Alliance of American Insurers	John Russell, PE, CSP	Keith Lessner
American Institute for Steel Construction	Thomas Schlafly	
American Society of Safety Engineers	Bruce Main, PE, CSP	George Karosas, PE, CSP
AMT- The Association For Manufacturing Technology	Russell Bensman	
Automotive Industry Action Group	Ron Tillinger	
Boeing	Robert J. Eaker, PE, CSP	Willard J. Wood
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Robotic Industries Association	Jeff Fryman	
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Sheet Metal & Air Conditioning Contractors' Natl. Assn.	Mike McCullion, CSP	
Tooling and Manufacturing Association	Daniel Kiraly	Allan Te Ronde
Toyota Motor Manufacturing North America	Barry Boggs	Tom Huff

At the time this standard was approved, the ANSI B11 ASC **B11.20 Subcommittee** had the following members who participated in the development of this revision:

Steve Dukich	Rockwell Automation	Chairman
Mike Crampton	General Motors	Secretary
Don Lawson	Pilz	Chairman (3/01 – 2/02)
Blake Consdorf	Wes-Tech	Chairman (3/02 – 9/02)
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Sam Boytor	Fox Controls	
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Mike Taubitz	General Motors Corporation	
Eric Thomas	Toyota Motor Manufacturing, NA	
Greg Todd	DaimlerChrysler Corporation	
Tony Bratkovich, PE	AMT	

Explanation of the format, and ANSI B11 conventions

This ANSI B11.20 – 2004 (R15) 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 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).

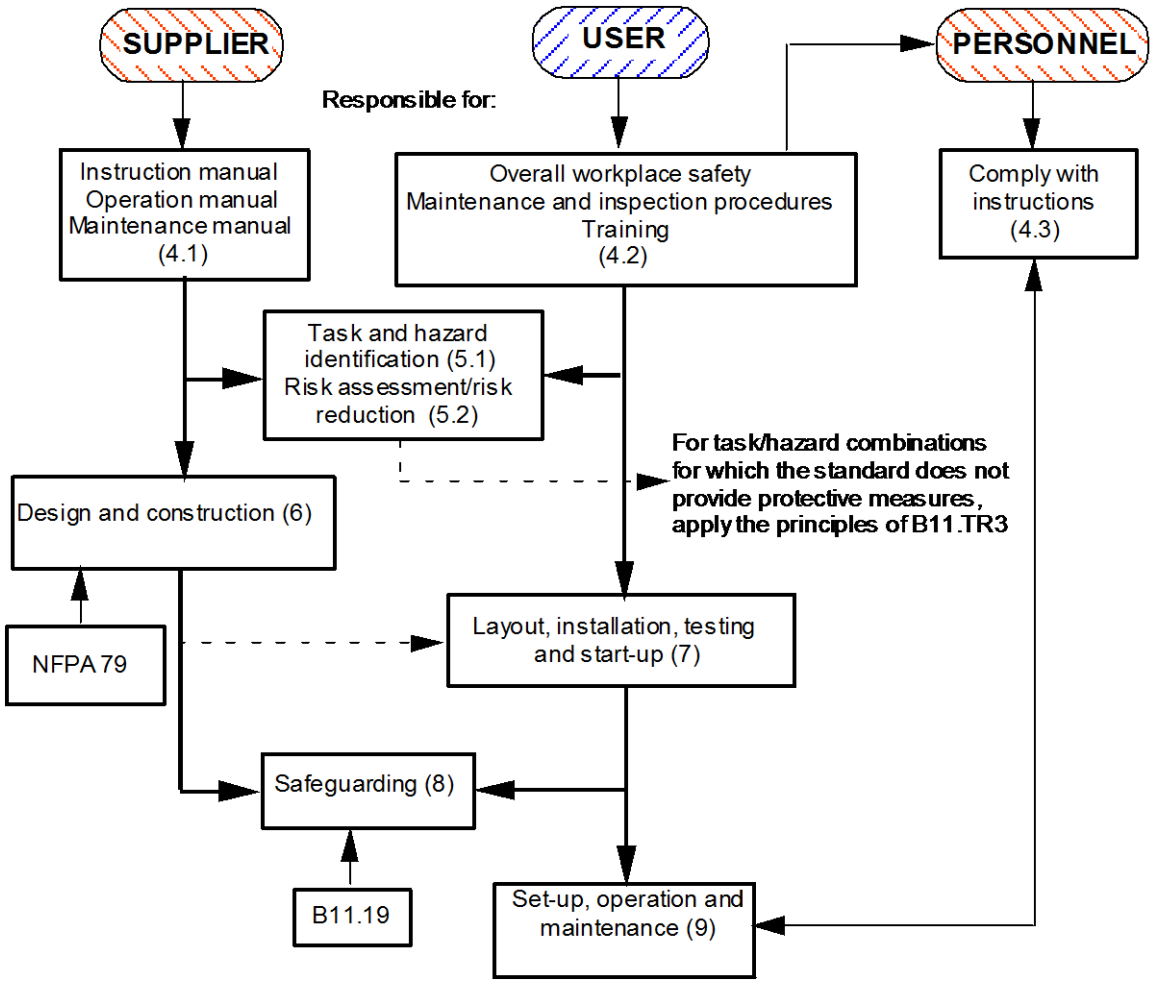
Suggestions for improvement of this standard will be welcome. They should be sent to B11 Standards, Inc. – POB 690905, Houston TX 77269 - Attention: B11 Secretariat.

Introduction

The primary purpose of every machine tool is to process parts. During production, maintenance, commissioning and de-commissioning, hazards exist that 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.

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 Machines –

Safety Requirements for Integrated Manufacturing Systems

STANDARDS REQUIREMENTS

EXPLANATORY INFORMATION

(Not part of the requirements of this American National Standard for Machine Tools – *Safety requirements for Integrated Manufacturing Systems – ANSI B11.20-2004 (R15)*).

1 Scope

1.1 General

This American National Standard specifies the safety requirements for the design, construction, set-up, operation and maintenance (including installation, dismantling and transport) of integrated manufacturing systems.

An integrated manufacturing system:

a) incorporates two or more industrial machines, at least one of which is a machine tool;
b) is linked by a material handling system;
c) is interconnected with and coordinated by a control system;
d) is capable of being re-programmed, re-configured or re-sequenced for the manufacturing of a variety of discrete parts or assemblies.

An integrated manufacturing system shall be designed and safeguarded to ensure proper and safe operation and maintenance in accordance with the risk assessment (see Clause 5).

E1.1

The terms “integrated manufacturing system,” and “integrated manufacturing cell” should be considered as synonymous. This may also be known as a “flexible manufacturing system.”

Integrated manufacturing systems may be comprised of two or more zones, each with their own individual controls.

Zones segment the integrated manufacturing system into manageable sections with defined purposes. See also, Annex D.

See Annex A for examples of integrated manufacturing systems.

1.2 Exclusions

This standard does not cover:

a) safety aspects of individual machines and equipment that may be covered by standards specific to those machines and equipment (B11 “base” standard);

NOTE: See inside cover of this standard for a list of the B11 ”base” standards.

b) transfer machines or transfer lines;

c) continuous flow processes.

E1.2

a) Where machines and equipment of an integrated manufacturing system are operated separately or individually, the relevant B11 safety standards for these specific machines and related equipment should apply.

b) See ANSI B11.24.

c) Examples of continuous flow processes include but are not limited to:

- petrochemical;
- food/beverage processing;
- textiles;
- rubber;
- pulp and paper;
- metal refining;
- printing.