

ANSI B11.0 – 2020

American National Standard *Safety of Machinery*

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FOREWORD

(This Foreword is not part of the requirements of this ANSI B11.0 Standard on Safety of Machinery.)

Overview

This American National Standard was promulgated by the B11 Accredited Standards Committee as a voluntary consensus standard to establish safety requirements for machinery and machinery systems. This standard specifies general safety requirements for the design, construction, operation and maintenance (including installation, dismantling and transport) of machinery and machinery systems. This standard also applies to devices that are integral to these machines.

This standard was first published in 2008 as ANSI B11 General Safety Requirements. It was revised, re-designated and published as ANSI B11.0 in 2010. The standard was again revised and published in 2015; that third edition of this standard added responsibilities related to machinery components, clarified the relationship between the risk assessment for the machine and the design specification for control systems, provided additional information on documentation requirements, included new clauses on supervision and training, presented new annexes correlating machinery safety standards in the U.S. and EN/ISO, and generally clarified and simplified text in the standard. The current edition of this American National Standard on the Safety of Machinery (ANSI B11.0-2020) includes updates in the following areas:

- guidance on how to use ANSI B11.0 and type-C standards ([Introduction](#));
- changes to terms used to improve precision of meaning (the Foreword and throughout);
- clarity of terms and definitions ([clause 3](#));
- clarity on responsibilities for component suppliers, machine suppliers and machine users ([4.3](#), [4.4](#) and [4.5](#));
- additional emphasis on the feasibility of risk reduction measures ([4.9](#) and [6.5.2](#));
- improved guidance on how to address existing (legacy) equipment ([4.14](#));
- additional guidance on prevention through design (PtD) ([6.5.1](#));
- additional guidance on achieving acceptable risk ([6.7](#) and [Annex G](#));
- additional guidance on validating and verifying risk reduction measures ([6.8](#));
- new content on layout analysis for control zones ([7.3.3](#) and [Annex J](#));
- new content on span of control ([7.3.4](#));
- new content for manual and special modes ([7.3.8](#) and [Annex K](#));
- new requirements for machinery systems ([7.17](#));
- updates to injury and severity correlations ([Annex E](#));
- new content related to how to use alternative methods for controlling hazardous energy (new [Annex L](#));
- updated outline for instruction handbook/manual ([Annex M](#));
- information on correlating various safety standards and on defining terms for affected persons ([Annex O](#) and [P](#));
- removal of unnecessary or redundant content.

The B11 standards for machine safety were first approved beginning with safety requirements for power presses in 1922. Since that time, safety requirements for a variety of machine tools have been developed and continually updated and revised to become the series of B11 standards and technical reports on machinery safety. Maintaining these documents with consistent language proved to be a significant challenge.

The concepts and principles contained in this standard can be applied very broadly to a wide variety of systems and applications. Documented risk assessments were first introduced to the machine tool industry in 2000 with the publication of (ANSI) B11.TR3 – *Risk Assessment and Risk Reduction – A Guide to Estimate, Evaluate and Reduce Risks Associated With Machine Tools*; to the robot industry in 1999 with the publication of ANSI/RIA R15.06-*Requirements for Industrial Robots and Robot Systems*; and to the packaging machinery industry in 2006 with the publication of ANSI/PMMI B155.1-*Safety Requirements for Packaging Machinery and Packaging-Related Converting Machinery*. Since that time, the principles of the risk assessment process have been applied to many applications – including traffic control, consumer products, incident investigations and, of course, machinery. Interested readers are encouraged to apply these principles and concepts to other systems in addition to machinery as suits their needs.

Prevention Through Design or PTD is a recent term in the industry; the objectives of risk assessment, risk reduction and elimination of hazards as early as possible are integral and not new to this standard. The phrase "Prevention Through Design" is used within the standard, as are other equivalent terms such as "elimination by design," "design out," and "substitution" to thoroughly address risk assessment and applying it to the lifecycle and operations of the machine.

Objective

The objective of the B11 series of standards is to eliminate injuries to personnel from machinery or machinery systems by establishing requirements for the design, construction, reconstruction, modification, installation, set-up, operation and maintenance of machinery or machine systems. This standard should be used by suppliers and users, as well as by the appropriate authority having jurisdiction. Responsibilities have been assigned to the supplier (i.e., manufacturer, the reconstructor, and the modifier), the user, and the user personnel to implement this standard. This standard is not intended to replace good judgment and personal responsibility. Personnel skill, attitude, training and experience are safety factors that need to be considered by the user.

Applying risk reduction measures to machinery is complicated by the wide variety of operations and operating conditions, including, but not limited to the following: the variations in size, speed, and type of machinery 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 feeding, including part and scrap removal. Because of these varying factors in the operations and in the workplace, a wide variety of risk reduction measures has been covered in this standard as well as the machine-specific "base" (type-C) safety standards.

Harmonization

This standard has been harmonized with international (ISO) and European (EN) standards by the introduction of hazard identification and risk assessment as the principal method for analyzing hazards to personnel to achieve a level of acceptable risk. This standard integrates the requirements of ISO 12100 parts 1 and 2, and ISO 14121 (now combined into a single standard – ISO 12100:2010), as well as selected U.S. standards. In 2012, the U.S. executed an identical national adoption of ISO 12100:2010, re-designated as ANSI/ISO 12100-2012 IDT (the "IDT" in the official alpha-numeric ANSI designation means identical and unchanged from the ISO version).

ISO 12100 was used as one of the principle resource documents in developing ANSI B11.0. However, the technical requirements of ISO 12100 have not been updated since the early 1990s (the content of ISO 12100 parts 1 and 2, and ISO 14121 were editorially combined without technical changes to create ISO 12100 (2010)). In addition, ISO 12100 only applies to the suppliers of machinery and is unable to include any requirements for users of machinery. ISO 12100 also only applies to new machinery and excludes existing machinery. ANSI B11.0 differs from ISO 12100 in that it specifically includes requirements for both suppliers and end users of machinery. It also includes numerous requirements and informative guidance and other information related to the safety of machinery which goes beyond that which is contained in ISO 12100.

As a result, complying with the requirements of ISO 12100 will not assure compliance with the requirements of ANSI B11.0. Conversely, compliance with ANSI B11.0 **will** automatically result in compliance with the requirements of ISO 12100. Figure 1 is an illustration of the relationship between these two standards.

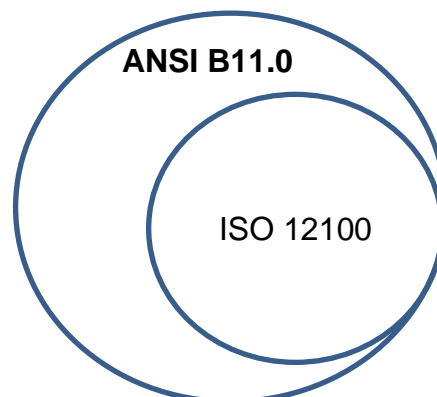


Figure 1 — Illustration of relationship between ISO 12100 and ANSI B11.0