# ANSI B11.16 (MPIF #47) (R09)

***American National Standard for Machine Tools -***

# *Safety Requirements for Powder/Metal Compacting Presses*

Secretariat and Standards Developing Organization

The Association for Manufacturing Technology
7901 Westpark Drive
McLean, VA 22102
Attn: Safety Department

**Approved: DECEMBER 17, 2003**
**Reaffirmed: September 9, 2009**
**by the American National Standards Institute**

# AMERICAN NATIONAL STANDARDS

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Published by: AMT – The Association For Manufacturing Technology
7901 Westpark Drive, McLean, VA 22102–4206, USA

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**Foreword** (This foreword is not part of American National Standard B11.16 - 2003 (MPIF #47).

The first standard for Metal Powder Compacting Presses was developed and approved by the Metal Powder Industries Federation (MPIF) in 1973 and published in 1974 as MPIF #47. It was subsequently revised in 1977. Recognizing the need for an ANSI safety standard for powder/metal compacting presses, the ANSI Accredited Standards Committee B11 on safety requirements for machine tools established Subcommittee B11.16 in 1985 to develop for its approval a draft standard to cover safety requirements for this equipment.

Because of the substantial use of compacting presses in the powder metallurgy industry and the MPIF involvement in the original writing of MPIF #47, this standard consistently refers to "metal" powder compacting presses. However, it is recognized that these presses are used in the compaction of all types of powders, metallic and nonmetallic and that the use of compacting presses in nonmetallic and advanced particulate material industries will continue to grow. It is the intention of the Subcommittee that this standard be applicable to all industries involved in powder compaction, regardless of the specified material utilized.

The primary objective of this standard is to eliminate injuries to personnel associated with presses used in the powder metal (P/M) industry by establishing safety requirements for the construction, safeguarding, operation and maintenance of P/M presses.

To accomplish this objective the B11.16 Subcommittee approached the safe operation of P/M presses from four directions:

- Eliminating certain recognized construction hazards by design and establishing standard approaches to design so that machines available from competitive suppliers will have similar operating control characteristics.
- Minimizing the necessity of having the operator place hands, fingers, or other body parts within the point of operation through design, procedure, and process, thus minimizing the operator's exposure to point of operation hazards.
- Safeguarding the point of operation to protect personnel, should they inadvertently expose themselves to hazards at the point of operation.
- Establishing guidelines for general training and specific job-related instruction for establishing safe practices and procedures for all personnel working on P/M presses.

It is recognized that the words "safe" and "safety" are not absolutes. Safety is influenced by many factors, including attitude. This standard is not intended to replace good judgment. Operator skill, training, experience, and job organization are all safety factors that must be considered in proper compliance with written regulations or recommended practice.

In order to achieve the above goals and to assist persons in the implementation of this standard, responsibilities have been assigned to the supplier (manufacturer, reconstructor, modifier), the employer and the employee. To achieve uniform interpretation, it is imperative to read and understand the definitions (Clause 3) used in this standard.

P/M presses 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.

Suggestions for improvement of this standard will be welcome. They should be sent to the Association for Manufacturing Technology, 7901 Westpark Drive, McLean, VA 22102, Attention: Safety Department. Recognizing the importance of distributing and encouraging the use of this standard as important to the proper use of the equipment described, it is recommended that all interested persons and associations make the availability of this standard known and encourage its use.

The standard was written by the B11.16 Subcommittee, processed by the Association for Manufacturing Technology, as the ANSI-accredited Standards Developing Organization, and finally, approved by the ANSI B11 Accredited Standards Committee and an MPIF review committee, for submittal to ANSI in accordance

with the requirements of the Accredited B11 Operating Procedures. The ANSI process provides for a consensus to be reached by a broad representation of associations, labor, safety organizations, federal government agencies, and industry.

ANSI B11 Accredited Standards 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*** | ***Name of Representative(s)*** | |
|---|---|---|
| | **Delegate** | **Alternate** |
| Aerospace Industries Association of America | Willard J. Wood, ARM | Robert J. Eaker, PE, CSP |
| Alliance of American Insurers | John Russell, PE, CSP (D) | Keith Lessner |
| American Society of Safety Engineers | Bruce Main, PE, CSP | George Karosas, PE, CSP |
| Association For Manufacturing Technology | Russell Bensman | |
| Automotive Industry Action Group | Ron Tillinger | |
| Can Manufacturers Institute | Geoffrey Cullen | |
| General Motors Corporation | Michael Taubitz | |
| John Deere | Gary D. Kopps | Ellen K. Blanshan |
| Metal Building Manufacturers Association | Charles J. Stockinger | Charles E. Praeger |
| Metal Powder Industries Federation | Dennis Cloutier, CSP | Teresa F. Stillman |
| National Institute for Occupational Safety & Health | John Etherton | |
| Packaging Machinery Manufacturers Institute | Charles F. Hayes | |
| Precision Metalforming Association | William Gaskin | Christie Carmigiano |
| Presence Sensing Device Manufacturers Association | Jim Kirton | Mike Carlson |
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| Scientific Technologies, Inc. | Frank Webster | Chris Soranno |
| Sheet Metal & Air Conditioning Contractors' Natl. Assn. | Mike McCullion, CSP, ARM | |
| Tooling and Manufacturing Association | Daniel Kiraly | Allan Te Ronde |
| Toyota Motor Manufacturing North America | Barry Boggs | Tom Huff |

At the time the standard was written, the following companies of powder metal press builders, end-user parts manufacturers, and trade association personnel supported and comprised membership on the B11.16 Subcommittee:

| | | |
|---|---|---|
| Dennis Cloutier, CSP | Chairman | Cincinnati Incorporated |
| Teresa Stillman | Secretary | Metal Powder Industries Federation |
| | Gary Barrett | Gasbarre Products Press Division |
| | Laird Brislen | Tamagawa Machinery |
| | Ronald Cejer | CIECO |
| | David Charley | General Motors Corporation |
| | Keith Chevalier | GKN Sinter Metals - Salem |
| | James Cretti, Jr. | Gasbarre Products Press Division |
| | Thomas Gasbarre | Gasbarre Products Press Division |
| | Tom Gaul | Keystone Powdered Metal Company |
| | James Gilbert | PTX-Pentronix |
| | Mel Henry | Gasbarre Products Press Division |
| | Jim Jones | GKN Sinter Metals - Emporia |
| | Roger Ketterer | GKN Sinter Metals - Salem |
| | Jack Krajcirik | Dorst America, Inc. |
| | Robert Krueger | Borg-Warner Automotive |
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| | Robert Pittan | Burgess-Norton Mfg. Co. |
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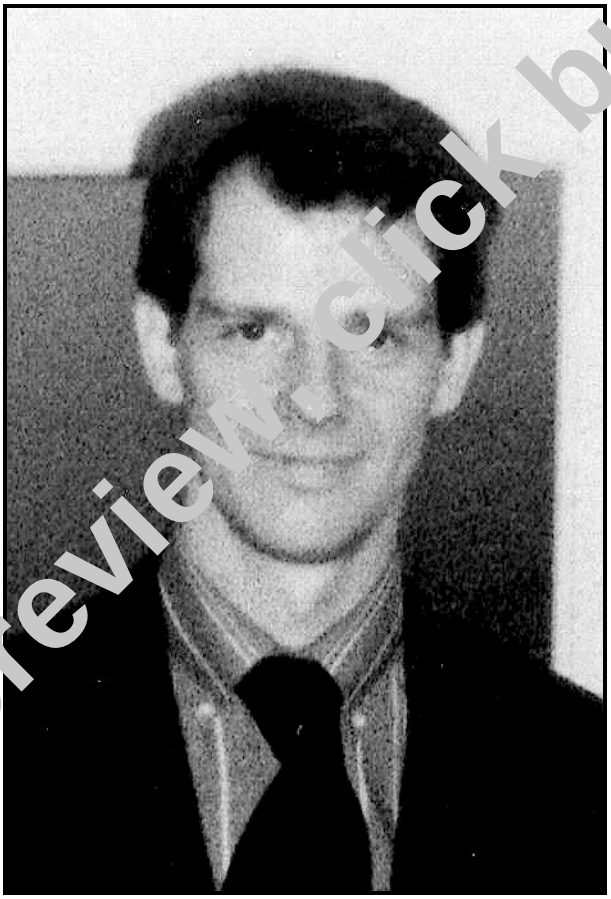
| | Joseph Skurka | Borg-Warner Automotive |
| | Tim Stauffer | Keystone Powdered Metal Company |
| | Michael Swiderski | Burgess-Norton Mfg. Co. |
| | Gary Todd | Cincinnati Incorporated |
| | Steve West | National Sintered Alloys, Inc. |
| | Fred Wheeler | PTX-Pentronix |
| | Matt Yow | Burgess-Norton Mfg. Co. |

The B11.16 Subcommittee and the
ANSI B11 Accredited Standards Committee
would like to dedicate this work to Mr. Mel Henry
who died in an airplane crash while returning from a
B11.16 Subcommittee meeting on September 8, 1994.



**In Sympathy and Fond Memory of Mel Henry**
**1958-1994**

# Explanation of the format, and ANSI B11 conventions

This ANSI B11.16 – 2003 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 a limiting device (e.g., backgage).

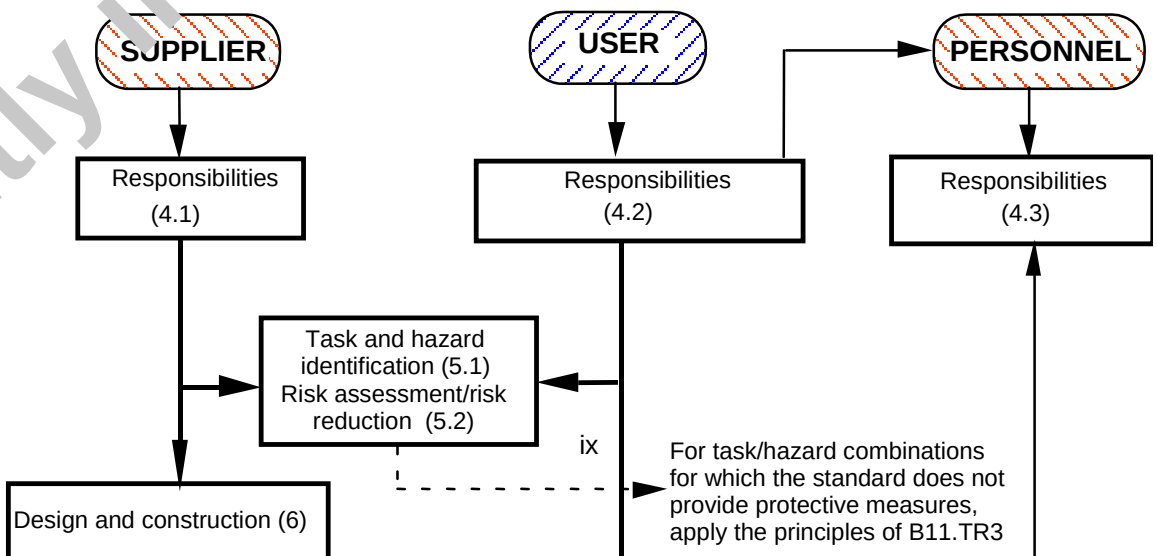
Suggestions for improvement of this standard will be welcome. They should be sent to AMT-The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, VA 22102 - Attention: B11 Secretariat.

## Introduction

The primary purpose of every machine tool is to process parts. This is accomplished by the machine imparting process energy onto the workpiece. 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 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 access to hazardous areas, and by devising work procedures to minimize personnel exposure to hazardous situations. This is the essence of the ANSI B11 series of safety standards.

The requirements of this ANSI standard are grouped according to those that apply to the supplier (i.e., manufacturer, modifier), the user and the user personnel. Some of these requirements are shared between the supplier and user and are so indicated (e.g., task and hazard identification, risk assessment / risk reduction, safeguarding). The responsibility of the supplier for layout and installation is to the extent that the user requires that involvement. The user personnel are required to use the skills, procedures, and information from training to maintain hazard control and equipment safeguarding.



# *American National Standard for Machine Tools –*
# *Safety Requirements for Powder/Metal Compacting Presses*

## STANDARD REQUIREMENTS

## 1 Scope and exclusions

### 1.1 Scope

The requirements of this standard apply to those mechanically or hydraulically powered machines that are designed, modified, or converted for the purpose of compressing metallic or nonmetallic powders.

These machines are commonly referred to as metal powder presses, powder metal presses, compacting presses, P/M briquetting presses, metal powder sizing presses or metal powder coining presses. For the purpose of this standard, they shall be referred to as "P/M presses."

P/M presses are composed of a frame, tooling platens, upper or lower rams or sliding anvil and may utilize any combination of mechanical, hydraulic, or pneumatic power.

### 1.2 Types of machines excluded

Excluded from this standard are:

- mechanical and hydraulic power press brakes;
- mechanical and hydraulic power presses;
- bulldozers;
- conventional hot bending and hot metal presses;
- conventional forging presses;
- hammers;
- riveting machines and similar types of fastener applications;
- isostatic and hydrostatic presses;
- high energy rate presses.

## EXPLANATORY INFORMATION

(Not part of American National Standard for Machine Tools –Safety Requirements for Powder/Metal Compacting Presses, ANSI B11.16 (MPIF #47) - 2003.

***E1.1***

P/M presses are composed of a frame, tooling platens and upper or lower rams. Mechanical P/M presses have fixed or moving die platens and utilize a single motion, multi-motion, rotary motion or sliding anvil motion. The tooling components are located in, or attached to the rams and are mechanically driven. Hydraulic P/M presses contain all the components and motions of mechanical machines but are hydraulically driven. "Hybrid" P/M presses may utilize any combination of mechanical, pneumatic or hydraulic power for driving the rams and have the same basic description as mechanical P/M presses.

P/M presses include compacting and certain automatic isostatic and hydrostatic P/M presses for the initial consolidation of powder into a desired shape, as well as coining and sizing presses for repressing of previously compacted parts.

P/M presses include compacting presses for the initial consolidation of powder into a desired shape, as well as coining and sizing presses for re-pressing of previously compacted parts. The unique characteristics that differentiate the P/M press from other presses are how it is used to achieve the conversion from metallic and nonmetallic powder to the green part or to size, coin, or densify the previously compacted P/M part. Typical nonmetallic powders are ceramics, various oxides, plastics, food products, chemicals and pharmaceutical powders. See Figures 2-11, Annex A.

***E1.2***

Typical of those machines excluded are metal stamping presses, sheet- and plate-working press brakes. See E1.1 regarding non-automatic isostatic and hydrostatic presses.

The unique characteristics described in E1.1 are those which differentiate between a conventional hot metal press, a P/M hot press, a forging press, and a P/M (coining) press. See 3.28 (hot forging) and 3.29 (hot pressing).

| Standard Requirements | Explanatory Information |
|---|---|
| **2 Normative References**<br>The following normative documents contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. | ***E2 Informative References***<br>All normative documents are subject to revision and users of this standard are encouraged to investigate applying the most recent revisions of the normative documents listed in clause 2.<br><br>The documents (in this column below) are listed for information only, and are not essential for the completion of the requirements of this standard: |
| ANSI B11.19–2003, Performance criteria for safeguarding | 29 CFR 1910.147 - Control of Hazardous Energy (Lock Out/Tag Out) (for more info, see www.osha.gov) |
| ANSI / ASSE Z244.1–2003, *Control of hazardous energy – Lockout/tagout and alternative methods* | 29 CFR 1910.333 b(2) Selection and Use of Electrical Work Practices (for more info, see www.osha.gov) |
| ANSI / ASME Boiler & Pressure Vessel Code, 2001, Division 1, Section VIII. | 29 CFR 1910.178 Powered Industrial Trucks |
| ANSI / NFPA 70 – 2002, National Electric Code | 29 CFR 1910.179 Overhead and Gantry Cranes |
| ANSI / NFPA 70E, Electrical Safety Requirements for Employee Workplaces | 29 CFR 1910.184 Slings |
| ANSI / NFPA-79-2002, Electrical Standard for Industrial Machinery | ANSI B11.TR3-2000 Risk Assessment and Risk Reduction – A guide to estimate, evaluate and reduce risks associated with machine tools |
| **3 Definitions** | |
| **3.1 antirepeat**: The part of the control system designed to limit the P/M press to a single stroke if the actuating control is maintained in an operating position. Antirepeat requires release of all actuating controls before another stroke can be initiated. Antirepeat may also be called single stroke reset or reset circuit. | ***E3.1*** Antirepeat requires the release of all actuating controls before another cycle (stroke) can be initiated.<br><br>Antirepeat is the control equivalent of a single-cycle (stroke) mechanism, with the additional requirement of the release of all actuating controls to enable a new cycle (stroke). The function of antirepeat is to prevent the successive cycles (strokes) that could occur if the antirepeat control did not exist. |
| **3.2 brake:** The mechanism used on a mechanical P/M press to stop the crankshaft, or hold the crankshaft stationary, either directly or through a gear train, when the clutch is disengaged. | ***E3.2*** The brake may be a constant drag type (typical on a full-revolution clutch machine) or may be of a type that is disengaged while the clutch is engaged (most typical with part-revolution clutch machines). |
| **3.3 brake monitor:** See ***stopping performance monitor***. | |
| **3.4 clutch:** An assembly used to connect and disconnect a driving and driven part of a mechanism and, when connected, transmits rotary motion from the driving to the driven member. | |
| **3.4.1 clutch, full-revolution:** A type of clutch that, when engaged, cannot be disengaged until the P/M press has completed a full cycle. | ***E3.4.1*** Positive type clutches are almost always full-revolution types. Usually, a tripping device releases spring pressure to move engaging members which by nature require a full revolution before they can be disengaged, generally by a throwout cam arrangement which is part of the clutch mechanism. |