

# MACHINE SAFETY STANDARDS

## European Machinery Directive & CE Marking

The European safety requirements for man and machine are established in the European Machinery Directive (EMD). According to the EMD, machinery must be designed and built to meet the Directive's requirements as defined by existing and emerging European standards. These "European Norms", prepared by representatives of the European Economic Community (EEC) member states and produced by the European standards committees CEN and CENELEC, provide a harmonized baseline for the design and construction of safe machinery.

As of January 1, 1997, machinery sold into or within the EEC must comply with the requirements of the European Machinery Directive. Equipment which complies may be affixed with the CE mark (for "Conformité Européenne"). The CE mark on a machine signifies that it conforms to the essential health and safety requirements defined by the relevant European Norms.

## EUROPEAN STANDARDS

These "Norms" form a hierarchical structure which include:

**Type A Standards:** Fundamental Safety Standards which contain basic concepts, principles of design, and general aspects applicable to all machinery.

**Type B Standards:** Group Safety Standards, each of which focuses on a specific subject applicable to a range of machinery types. "B1 Standards" cover a specific safety aspect defined in the Fundamental Standards. "B2 Standards" cover the requirements of specific safety related devices such as two-hand controls, interlocking devices, movable guards, etc.

**Type C Standards:** Specific Machine Safety Standards, each of which define protective measures required for hazardous areas of a specific machine or group of machines.

Type A and Type B Standards are intended to assist in the machinery design process, and eliminate the need to repeat these general requirements in the machine-specific (Type C) Standards.

Many product standards are still in the planning stage and the number of Type C Standards is continuously increasing. Some are still in draft form (designated as "prEN" standards). Others exist as finished ("EN") standards.

Where no machine-specific standard exists, the requirements of the Machinery Directive can be satisfied by observing existing European Standards and relevant national standards/specifications. Draft standards (prEN) published by the European Union are also accepted and used as a basis for evaluating products for compliance to the Directives. It is important to note that such draft standards may change before being finalized and adopted as EN standards.

## Selected European Standards

### Type "A" Standards:

EN ISO 12100, Safety Machinery – Basic Concepts, General Principles of Design, Parts 1 & 2.

### Type "B1" Standards:

EN ISO 13849-1 Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design

EN ISO 13857 Safety of Machinery – Safety Distances to Prevent Danger Zones from Being Reached by Upper and Lower Limbs.

EN349 Safety of Machinery – Minimum Gaps to Avoid Crushing of Parts of the Human Body.

EN ISO 13855 Safety of Machinery – The Positioning of Protective Equipment in Respect of Approach Speeds of the Human Body.

EN ISO 12100 Safety of Machinery – Principles of Risk Assessment.

### Selected Type "B2" Standards:

EN ISO 13850 Safety of Machinery – Emergency Stop Devices, Functional Aspects – Principles for Design.

EN 574 Safety of Machinery – Two-Hand Control Devices, Functional Aspects – Principles for Design.

EN1088 Safety of Machinery – Interlocking Devices Associated with Guards – Principles for Design & Selection.

EN 953 Safety of Machinery – General Requirements for the Design and Construction of Guards.

EN1760-1 Safety of Machinery – Pressure Sensitive Safety Devices – Mats & Floors.

EN1760-2 Safety of Machinery – Pressure Sensitive Safety Devices – Edges & Bars.

prEN61496 Safety of Machinery – Electrosensitive Protective Equipment.

**Type “C” Standards:**

EN415 Packaging Machines

EN692 Mechanical Presses

EN693 Hydraulic Presses

EN746 Thermoprocessing Machines

EN931 Footwear Manufacturing Machines

EN1114-1 Rubber & Plastics Machines

EN1114-2 Food Processing Machines

**US STANDARDS:**

In the United States, the protection of workers is the primary concern of OSHA, the Occupational Health and Safety Administration, a division of the Department of Labor. OSHA’s role is to assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Occupational Safety & Health Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health. OSHA is the primary regulatory agency for safety and health, setting national standards and providing for the enforcement thereof. OSHA also relies on consensus standards. These are guidelines and standards created by standards-making organizations, trade associations, and third party testing facilities. In the machinery industry, these include: American National Standards Institute (ANSI) Robotics Industry of America (RIA) Instrument Society of America (ISA) National Fire Prevention Association (NFPA) Underwriters Laboratories, Inc. (UL) **Selected US Standards and Guidelines**

**OSHA 29 CFR 1910.212**

General Requirements for (Guarding of) All Machines

**OSHA 29 CFR 1910.217**

(Guarding of) Mechanical Power Presses

**ISA S84.01**

Safety Instrumented Systems

**ANSI B11.1**

Machine Tools – Mechanical Power Presses – Safety Requirements for Construction, Care, and Use of

**ANSI B11.2**

Hydraulic Power Presses – Safety Requirements for Construction, Care, and Use of

**ANSI B11.3**

Power Press Brakes – Safety Requirements for Construction, Care, and Use of

**ANSI B11.4**

Shears – Safety Requirements for Construction, Care, and Use of

**ANSI B11.5**

Machine Tools – Iron Workers – Safety Requirements for Construction, Care, and Use of

**ANSI B11.6**

Lathes – Safety Requirements for Construction, Care, and Use of

**ANSI B11.7**

Cold Headers & Cold Formers – Safety Requirements for Construction, Care, and Use of

**ANSI B11.8**

Drilling, Milling, and Boring Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.9**

Grinding Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.10**

Metal Sawing Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.11**

Gear Cutting Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.13**

Machine Tools – Single- and Multiple-Spindle Automatic Bar and Chucking Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.14**

Coil Slitting Machines/Systems – Safety Requirements for Construction, Care, and Use of

**ANSI B11.15**

Pipe, Tube, and Shape Bending Machines – Safety Requirements for Construction, Care, and Use of

**ANSI B11.16**

Metal Powder Compacting Presses – Safety Requirements for Construction, Care, and Use of

**ANSI B11.17**

Horizontal Extrusion Presses – Safety Requirements for Construction, Care, and Use of

**ANSI B11.18**

Machinery and Machine Systems for the Processing of Coiled Strip, Sheet, and Plate – Safety Requirements for

**ANSI B11.19**

Performance Criteria for the Design, Construction, Care, and Operation of Safeguarding when Referenced by Other B11 Machine Tool Safety Standards

**ANSI B11.20**

Machine Tools – Manufacturing Systems/Cells – Safety Requirements for Construction, Care, and Use of

**ANSI B183**

Roll Forming and Roll Bending Machines – Safety Requirements for Construction, Care, and Use of

**ANSI/RIA 15.06**

Safety Requirements for Industrial Robots and Robot Systems

**NFPA 79**

Electrical Standard for Industrial Machinery 1994 Edition

**CANADIAN STANDARDS:**

In Canada, each province has its own regulatory body for occupational health and safety, such as the Ministry of Labour in Ontario. There are fourteen jurisdictions – one federal, ten provincial, and three territorial – each governing the way industrial safety is implemented and enforced in their specific province or territory. Federal legislation covers employees of the federal government and Crown agencies and corporations across Canada. In each province or territory, there is an act (typically called the Occupational Health and Safety Act, or something similar) which applies to most workplaces in that region.

**Duties of Employers and Other Persons**

The various Occupational Health and Safety Acts impose duties on those who have any degree of control over the workplace, the materials and equipment in the workplace, and the direction of the work force. There is a general duty on employers to take all reasonable precautions to protect the health and safety of workers. In addition, the Act and regulations set out many specific responsibilities of the employer. For example, there are duties that specifically relate to toxic substances, hazardous machinery, worker education,

and personal protective equipment. There is a duty on all officers and directors of corporations to ensure that their corporations comply with the Act and regulations. The duties of workers are generally to work safely, in accordance with the Act and regulations.

**Canadian Regulatory Agencies**

Please find the regulatory agency in each province and territory as below:

**Alberta**

Workplace Health and Safety, Alberta Employment and Immigration

**British Columbia**

WorkSafeBC

**Manitoba**

SAFE Manitoba

**New Brunswick**

WorkSafeNB

**Newfoundland and Labrador**

Occupational Health and Safety Branch, Department of Government Services

**Northwest Territories and Nunavut**

Workers' Compensation Board of the Northwest Territories and Nunavut

**Nova Scotia**

Occupational Health & Safety Division, Nova Scotia Labour and Workforce Development

**Ontario**

Occupational Health and Safety Branch, Ministry of Labour

**Prince Edward Island**

Occupational Health and Safety Division, Workers' Compensation Board

**Quebec**

Commission de la santé et de la sécurité du travail du Québec (Occupational Health and Safety Commission of Quebec)

**Saskatchewan**

Occupational Health and Safety Division, Saskatchewan Ministry of Advanced Education, Employment and Labour

**Yukon**

Yukon Workers' Compensation Health and Safety Board

**Resources:**

There is also a national Canadian Standards Association that sets safety standards which are voluntary and represent best practices. CSA standards may be enforced by law when referenced in provincial, territorial or federal legislation or regulations. These standards are designed to be complementary to the actions of government in tackling the issue of worker safety and can provide tools to help organizations comply with regulations and demonstrate due diligence.

**Relevant Canadian Standards****CAN/CSA-Z142-10**

Code for Power Press Operation: Health, Safety, and Guarding Requirements

**CAN/CSA-Z432-04**

Safeguarding of Machinery

**CAN/CSA-Z434-03**

Industrial Robots and Robot Systems – General Safety Requirements

**CAN/CSA-Z460-05**

Control of Hazardous Energy – Lockout and Other Methods

**CAN/CSA-Z615-87 (R2006)**

Code for Hot Forging Producers, Health and Safety Requirements

**CAN/CSA-Z462**

Workplace Electrical Safety

**CAN/CSA-Z1002**

Injury Risk Assessment and Management

**CAN/CSA-Z1006**

Work in Confined Spaces

**CAN/CSA-Z1004**

General Workplace Ergonomics

**CAN/CSA Z1000-06**

Occupational Health and Safety Management

**CAN/CSA-Z1600**

Emergency Management and Business Continuity Programs

**SOURCES FOR STANDARDS:**

EN & IEC Standards are available from:

Global Engineering Documents  
15 Inverness Way East  
Englewood, CO 80112  
Telephone: (800) 854-7179

American National Standards Institute (ANSI)  
11 West 42nd Street  
New York, NY 10036  
Telephone: (212) 642-4900

ANSI & NFPA Standards are available from:

American National Standards Institute (ANSI)  
11 West 42nd Street  
New York, NY 10036  
Telephone: (212) 642-4900

OSHA Regulations are available from:

Superintendent of Documents  
Government Printing Office  
Washington, DC 20402-9371  
Telephone: (202) 783-3238

CSA Standards are available from:

CSA Head Office – Mississauga  
5060 Spectrum Way, Suite 100  
Mississauga, Ontario L4W 5N6 CANADA