

Standards

The following list of standards is grouped by subject matter, from general in nature to specific machine application. The “A” and “B” level are separated into U.S. standards and International/European standards. The “C” level is based on machine, industry, or application specific standards.

The following list of standards addresses the safe use of industrial machinery and is not all-inclusive; the user must ensure all relevant standards are reviewed for each application.

NOTE: Among the subject areas that are not included below are Hand Tools, Mining, Explosive Atmospheres, Process Control, and Personal Protective Equipment.

Standards Addressing General Requirements (“A” Level Standards)

U.S.

OSHA 29CFR1910

(applicable provisions – see www.osha.gov for further information)

OSHA 29CFR1910.212

General Requirements for (Guarding of) All machines

International/European

ISO12100-1&2 (EN292)

Safety of Machinery: Basic Concepts, General Principles for Design

ISO14121 (EN1050)

Safety of Machinery: Risk Assessment

Standards Addressing Safety, Safeguarding, and Methodologies (“B” Level Standards)

U.S.

ANSI/NFPA70

The National Electrical Code

ANSI/NFPA70E

Electrical Safety Requirements for Employee Workplaces

ANSI/NFPA79

Electrical Standard for Industrial Machinery (Aligned with IEC60204-1)

OSHA 29CFR1910.333

Selection and Use of Work Practices (Electrical Safety)

OSHA 29CFR1910.147

The Control of Hazardous Energy (Lockout/Tagout)

ANSI Z244.1

Lockout/Tagout of Energy Sources

ANSI Z535.1

Safety Color Code

ANSI Z535.2

Environmental and Facility Safety Signs

ANSI Z535.3

Criteria for Safety Symbols

ANSI Z535.4

Product Safety Signs and Labels

ANSI Z535.5

Accident Prevention Tags and Labels

ANSI Z136.1

Safe Use of Lasers

ANSI B11.21

Machine Tools Using Lasers – Safety

OSHA 29CFR1910.219

Mechanical Power Transmission Apparatus

ANSI/ASME B15.1

Mechanical Power Transmission Apparatus

ANSI B11.19

Safeguarding (Machine Tools)

ANSI B11/TR1

Ergonomic Guidelines

ANSI B11/TR3

Risk Assessment / Risk Reduction

MIL-STD-882D

U.S. DOD System Safety Program (Risk Assessment)

OSHA 3071

Job Hazard Analysis

Standards Addressing Safety, Safeguarding, and Methodologies (“B” Level Standards), continued

International/European

IEC60204-1

Electrical Equipment of Machines
(Aligned with NFPA79)

ISO14118 (EN1037)

Prevention of Unexpected Start Up

ISO4413 (EN982)

Safety Requirements for Fluid Power Systems
– Hydraulics

ISO4414 (EN983)

Safety Requirements for Fluid Power Systems
– Pneumatics

IEC60947-1

Low Voltage Switchgear and Controlgear

IEC60947-5-1

Low Voltage Switchgear and Controlgear
– Control Devices and Switching Elements

ISO13849-1 (EN954-1)

Safety Related Parts of Control Systems

ISO13849-2 (draft)

Safety Related Parts of Control Systems
– Validation

ISO13849-100 (draft)

Safety Related Parts of Control Systems
– Guidelines to Understanding/Using

IEC62061 (draft)

Functional Safety of Electrical/Electronic/
Programmable Control Systems

IEC61508

Functional Safety of Electrical /Electronic/
Programmable Electronic Safety Related
Systems (Software/Firmware)

ISO13852 (EN294)

Safety Distances to Prevent Danger Zones
from Being Reached by Upper Limbs

ISO13853 (EN811)

Safety Distances to Prevent Danger Zones
from Being Reached by Lower Limbs

ISO13854 (EN349)

Minimum Gaps to Avoid Crushing Parts of the
Human Body

ISO14120 (EN953)

Guards – General Requirements for the
Design and Construction

ISO13855 (EN999)

Hand/Arm Speed – Positioning Protective
Equipment

ISO13851 (EN574)

Two-Hand Control Devices

ISO14119 (EN1088)

Interlocking Devices With and Without
Guard Locking

ISO13856 (EN1760)

Pressure Sensitive Protective Devices
(e.g., Safety Mats and Edges)

IEC61496-1

Electro Sensitive Protective Equipment
– General Requirements

IEC61496-2

Electro Sensitive Protective Equipment
(Safety Light Screens)

IEC61496-3

Electro Sensitive Protective Equipment
(Area Scanners)

ISO13850 (EN418)

Emergency Stop Devices, Functional
Aspects – Principles for Design

IEC60947-5-5

Low Voltage Switchgear and controlgear
– Control Circuit Devices and Switching
Elements – Electrical Emergency Stop
Device w/ Latch

IEC60529

Degrees of Protection Provided by
Enclosures

IEC1131

Programmable Controllers

Industry Abbreviations

ANSI

American National Standards Institute

ASME

American Society of Mechanical Engineers

EN

Euronorm – Official European Standard

IEC

International Electro-Technical Commission

ISO

International Standards Organization

MIL STD

U.S. Department of Defense Standard

NFPA

National Fire Protection Association

OSHA

Occupational Health and
Safety Administration

prEN

Provisional Euronorm – Draft European
Standard

RIA

Robotics Industries Association

Standards Addressing Specific Machine Applications (“C” Level Standards), Grouped by Type

Machine Tools

OSHA 29CFR1910.217

(Guarding of) Mechanical Power Press

ANSI B11.1

Mechanical Power Presses

EN692

Mechanical Power Presses

ANSI B11.2

Hydraulic Power Presses

EN693

Hydraulic Presses – Safety

ANSI B11.3

Power Press Brakes

EN12622

Hydraulic Press Brake – Safety

prEN13736

Pneumatic Presses – Safety

ANSI B11.4

Shears

prEN13985

Guillotine Shears – Safety

ANSI B11.5

Iron Workers

ANSI B11.6

Lathes

prEN13788

Horizontal Single Spindle and Multi-Spindle Automatic Lathes

ANSI B11.7

Cold Headers and Cold Formers

ANSI B11.8

Drilling, Milling and Boring Machines

EN13128

Milling Machines (Including Boring Machines)

ANSI B11.9

Grinding Machines

EN13218

Stationary Grinding Machines

ANSI B11.10

Sawing Machines

prEN 13898

Sawing Machines for Cold Metal – Safety

ANSI B11.11

Gear Cutting Machines

ANSI B11.12

Roll Forming and Roll Bending Machines

prEN13675

Safety Requirements for Tube Forming and Rolling Mills and Finishing

ANSI B11.13

Automatic Bar and Chucking Machines

ANSI B11.14

Coil Slitting Machines/Systems

ANSI B11.15

Pipe, Tube and Shape Bending Machines

ANSI B11.16

Powder Metal Presses (withdrawn, in process of being reactivated 10/2002)

ANSI B11.17

Horizontal Hydraulic Extrusion Presses

EN1114

Extruders and Extrusion Lines

ANSI B11.18

Coil Processing Equipment

ANSI B11.20

Manufacturing Systems / Cells

ISO11161

Industrial Automation / Safety of Integrated Manufacturing Systems

ANSI B11.22

Numerically Controlled Turning Machines

EN12415

Small Numerically Controlled Turning Machines and Turning Centres

EN12478

Large Numerically Controlled Turning Machines and Turning Centres

EN12417

Machining Centers

ANSI B11.23

Automatic Drilling, Milling and Boring Machines

ANSI B11.24

Transfer Machines

prEN14070

Transfer and Special-Purpose Machines – Safety

Conveyors

ANSI/ASME B20.1

Conveyors and Related Equipment

ISO4123

Belt Conveyors

ISO9851

Overhead Electrical Monorail Conveyors

Industrial Robots

ANSI/RIA R15.06

Industrial Robots and Robot Systems

ISO10218

Manipulating Industrial Robots – Safety

EN775

Manipulating Industrial Robots

Standards Addressing Specific Machine Applications (“C” Level Standards), Grouped by Type, continued

Injection Molding

ANSI B151.1

Horizontal Injection Molding Machines

ANSI B151.21

Injection Blow Molding Machines – Safety

ANSI B151.26

Dynamic Reaction – Injection Molding Machines

ANSI B151.27

Plastics Machinery – Robots Used With HIM Machines – Safety

ANSI/SPI B151.29

Vertical Clamp Injection Molding Machines

EN201

Injection Molding Machines

EN289

Compression and Transfer Molding Presses

EN422

Blow Molding Machines

EN1612

Reaction Molding Machines

Mills and Calenders

OSHA 29CFR1910.261

Pulp, Paper, and Paperboard Mills

OSHA 29CFR1910.216

Mills and Calenders in the Rubber and Plastics industries

ANSI B28.1

Safety Code for Rubber Mills and Calenders

EN1417

Rubber and Plastics Machines – Two-Roll Mills

Packaging

ANSI/PMMI B155.1

Packaging and Packaging-Related Converting Machinery – Safety

EN415-1

Terminology and Classification of Packaging Machines

EN415-2

Preformed Rigid Container Packaging Machines

EN415-3

Form, Fill, and Sealing Machines

EN415-4

Palletizers and Depalletizers

EN415-5

Wrapping Machines

EN415-6

Machines to Form Collective Packaging

EN415-7

Machines to Ensure Cohesion of Load Units

Cranes

OSHA 29CFR1910.179

Overhead and Gantry Cranes

ANSI/ASME B30.5

Mobile and Locomotive Cranes

Printing

ANSI/B65.1

Printing Press Systems

ANSI/B65.2

Binding and Finishing Systems

ANSI/B65.5

Stand Alone Platen Presses

ISO12648

Safety Requirements for Printing Press Systems

ISO/CD 12649

Safety Standard for Binding and Finishing Systems and Equipment

Semiconductor

SEMI S1

Safety Guideline for Equipment Safety Labels

SEMI S2

Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment

SEMI S3

Safety Guidelines for Heated Chemical Baths

SEMI S7

Safety Guidelines for Environmental, Safety, and Health (ESH) Evaluation of Semiconductor Manufacturing Equipment

SEMI S8

Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment

SEMI S9

Safety Guideline for Electrical Design Verification Tests for Semiconductor Manufacturing Equipment

SEMI S10

Safety Guideline for Risk Assessment

SEMI S13

Safety Guidelines for Operation and Maintenance Manuals Used with Semiconductor Manufacturing Equipment

SEMI S17

Safety Guideline for Unmanned Transport Vehicle (UTV) Systems

SEMI S19

Safety Guideline for Training of Semiconductor Manufacturing Equipment Installation, Maintenance and Service Personnel

Woodworking, Lumber, and Logging

OSHA 29CFR1910.213

Woodworking Machinery Requirements

OSHA 29CFR1910.261

Pulp, Paper, and Paperboard Mills

OSHA 29CFR1910.265

Sawmills

OSHA 29CFR1910.266

Logging Operations

ANSI O1.1

Woodworking Machinery, Safety Requirements

ANSI O2.1-1983

Sawmills – Safety Requirements [Withdrawn]

ANSI O3.1-1978

Safety Requirements for Pulpwood Logging [Withdrawn]

EN847

Tools for Woodworking – Safety Requirements

EN848

Safety of Woodworking Machines – One Side Molding Machines with Rotating Tool

EN1870

Safety of Woodworking Machines – Circular Sawing Machines

STANDARD and DOCUMENT SOURCES

OSHA Documents

Superintendent of Documents Government Printing Office
<http://www.osha.gov>

ANSI Accredited Standards

American National Standards Institute (ANSI)
<http://web.ansi.org>

B11 Documents

AMT – The Association for Manufacturing Technology
<http://www.mfgtech.org>

RIA Documents

RIA - Robotics Industries Association
<http://www.robotics.org>

NFPA Documents

National Fire Protection Association
<http://www.nfpa.org>

Alternate Sources (ISO, IEC, EN, DIN and BS Standards)

Global Engineering Documents

<http://www.global.ihs.com>

National Standards Systems Network (NSSN)

<http://www.nssn.org>

Document Center, Inc.

<http://www.document-center.com>