

Machine Safety Checklist

Are Your Machines Safe?

Some machine hazards are easily identified, while others may not be as obvious. Key indicators that your machine may be unsafe:

- ▶ History of accidents or near misses
- ▶ No lockable isolators for all energy sources
- ▶ Missing guarding, so hazards are accessible
- ▶ No modern safety control system
- ▶ No risk assessment on file for the machine
- ▶ Operators or maintenance resources do not feel safe performing certain tasks

Who is Responsible for Machine Safety?

Leading manufacturers recognize the importance of a safe working environment for their employees. This is especially true for the operations and maintenance resources that are interacting with production machines daily. Whether these machines are older or brand new, it is the responsibility of the manufacturer to ensure their safe operation. Polytron's complimentary Machine Safety Checklist will help you begin this essential process.

Using the Checklist

- ▶ The evaluation should be performed by resources that are familiar with the machine's functionality, energy sources, and hazards
- ▶ Best results are often achieved when the evaluation is performed by a cross-functional team
- ▶ Print a copy of the Machine Safety Checklist for each machine to be evaluated
- ▶ Use the Safety Standards - Quick Reference as a guide when answering each question
- ▶ Assess the results for each machine, and seek support from a certified safety consultant, as needed



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Disclaimer: This is a discovery document and the results do not certify compliance with any regulatory or safety standards.



Machine Safety Checklist

Company Name		Machine Manufacturer	
Location (City, State)		Model Number	
Area, Line, or Process		Machine Type or Function	
Evaluation Performed By			

Corporate Safety Standards: Before evaluating your machine, please review any corporate or plant safety standards that are applicable. These standards may provide additional requirements for machine safety.

Safety History: Review your plant's safety records to understand the machine's safety history. If any accidents or near misses are recorded, pay particular attention to the corresponding hazards during your evaluation. Log any significant safety events in the table below:

Date of Event	Description of Event

Energy Sources: Be aware of all energy sources on the machine. If possible, isolate these energy sources during the evaluation to help ensure your safety. Select all energy sources that apply to this machine:

<input type="radio"/> Electrical	<input type="radio"/> Pneumatic	<input type="radio"/> Hydraulic	<input type="radio"/> Steam	<input type="radio"/> Thermal	<input type="radio"/> Chemical
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Safety Control System: Identify all types of safety logic devices on the machine. Select multiple, if appropriate:

<input type="radio"/> Programmable Safety PLC	<input type="radio"/> Configurable Safety Controller	<input type="radio"/> Safety Relays	<input type="radio"/> No Safety Logic Device
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Checklist: Complete the machine safety checklist below. Refer to the Safety Standards – Quick Reference on the next page for more information. If you are unsure about how to answer any question, select 'No'.

Item	Question	Yes	No	Refer to Standards:
1	Is there a Risk Assessment on file for this machine? Does the Risk Assessment establish the required Performance Level (PLr) for the safety control system?			A, B, C
2	Does each energy source have a manual, lockable isolator located near the machine? Is each isolator properly labeled? Is all residual energy relieved or rendered safe?			D, E
3	Are safe work procedures up to date and posted at the machine? This includes Lockout, Minor Servicing Exception task list, and PPE requirements.			F
4	Have all users of the machine been adequately trained in correct use, risks, and precautions?			G
5	Is the machine stable and secured in place?			H
6	Is there electrical drop-out protection for the machine?			I
7	Do the machine's guards and/or electro-sensitive protective devices (ESPE) such as light curtains or safety laser scanners prevent access to hazards by reaching over, under, around, or through?			J
8	For guards doors with interlocking devices that do not include guard locking, is the door opening located beyond the calculated Safety Distance from the hazards?			K
9	Are the electro-sensitive protective devices located beyond the calculated Safety Distance from the hazards?			K
10	If whole body access is possible, do presence-sensing devices and/or inhibit functions prevent unexpected startup while the person is in the hazard area?			L, M
11	Do all emergency stop devices meet the requirements for type, location, stop category, and color?			N, O, P, Q, R
12	Has the Performance Level (PL) achieved by the safety control system been calculated, and does the PL achieved meet or exceed the PLr from the Risk Assessment?			S
13	Does the machine have appropriate awareness signage and devices to alert users of hazards or hazardous situations?			T
14	Are safety inspections and functional safety tests performed regularly?			U, V

Assessing Your Results: If you answered "No" to any items on the checklist or if there have been any accidents or near misses that have not been addressed through appropriate risk reduction measures, Polytron recommends having a certified safety consultant review the machine with you.

Safety Standards - Quick Reference

Excerpts from Applicable Standards	
A	OSHA 29 CFR 1910.132(d)(2): "The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment."
B	ANSI RIA 15.06 (2012) Clause 4: "Annex A contains a list of hazards that can be present with robots. A hazard analysis shall be carried out to identify any further hazards that may be present. A risk assessment shall be carried out on those hazards identified in the hazard identification."
C	ANSI B11.0 (2020) Clause 5.3: "Machinery users shall use a risk assessment process such as the one described in clause 6 in the operation and maintenance of machinery to meet the applicable requirements of clause 7 and any applicable machine-specific "base" (type-C) safety standard."
D	OSHA 29 CFR 1910.147(c)(1): "Before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative."
E	NFPA 79 (2012) Clause 5.5.5: "The isolation devices in 5.5.4 shall be as follows: (1) Readily accessible, (2) Within sight of the part of the machine requiring disconnection, (3) Readily identifiable as an isolating means and marked to identify the equipment that is disconnected, (4) Provided with permanent means for locking in the off position only"
F	ANSI B11.19 (2019) Clause 11.3.2.1: "The user shall review the risk reduction measures and the training used to determine if safe work procedures are required. Where required, the user shall develop the procedure(s) and confirm its (their) use."
G	ANSI B11.19 (2019) Clause 11.3.3: "The user shall verify an appropriate training program is developed for operators, helpers, maintenance personnel, supervisors, and other individuals who can be exposed to the hazards of the machine. The user shall verify that individuals listed above are trained based on the program developed. For those individuals trained above, the user shall verify their understanding and provide for their continued competency."
H	OSHA 29 CFR 1910.212(b): "Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving."
I	NFPA 79 (2012) Clause 7.5.3: "Restarting. Upon restoration of the voltage or upon switching on the incoming supply, automatic or unintentional restarting of the machine shall be prevented when such a restart causes a hazardous condition."
J	ANSI B11.19 (2019) Clause 8.1.1.3: "The design and construction of a guard shall prevent or reduce access to a hazard zone, or prevent or reduce contact with a hazard."
K	ANSI B11.19 (2019) Clause 9.6.1: "When required by this standard, the engineering controls (guards or devices) shall be located at a distance from any associated hazard(s) within the span of control such that individuals will not be exposed to a hazard(s)."
L	ANSI B11.19 (2019) Clause 9.11.1.2: "The safeguarded space shall be established by engineering controls in accordance with clauses 8 or 10 as applicable. The engineering control(s) shall be designed to eliminate a hazardous situation(s) and prevent the start-up (initiation) of hazardous situation(s) while an individual(s) is in the safeguarded space."
M	ISO 14118 (2017) Clause 4.3: "If the use of manual isolation and energy dissipation is not appropriate for frequent short interventions, the designer shall provide additional automatic controlled functions (see Clause 6) to prevent unexpected start-up."
N	ISO 13850 (2015) Clause 4.3.1: "The actuator of the emergency stop device may be one of the following types: a) pushbuttons easily activated by the palm of a hand; b) wires, ropes, bars; c) handles; d) foot-pedals without a protective cover."
O	ISO 13850 (2015) Clauses 4.1.1.1: "The emergency stop function is to be initiated by a single human action."
P	ISO 13850 (2015) Clause 4.3.2: "An emergency stop device shall be located: at each operator control station; at other locations, as determined by the risk assessment, e.g.: at entrance and exit locations; at all places where a man / machine interaction is expected by design (loading / unloading zone for example). The actuator of emergency stop device intended to be actuated by hand should be mounted between 0.6 m (23.6") and 1.7 m (66.9") above the access level (e.g. floor level, platform level)."
Q	ISO 13850 (2015) Clause 4.1.3: "The emergency stop shall function in accordance with either of the following stop categories (see also IEC 60204-1). The relevant stop category shall be selected by the risk assessment. Stop category 0: Stopping by immediate removal of power to the machine actuators. Stop category 1: Stopping movements and operations with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved."
R	ISO 13850 (2015) Clause 4.3.6: "The actuator of the emergency stop device shall be colored RED. As far as a background exists behind the actuator and as far as it is practicable, the background shall be colored YELLOW."
S	ISO 13849-2 (2012) Clause 9.6: "The following verification and validation steps shall be performed: checking for correct evaluation of PL based on the category, DCavg and MTTFd (according to ISO 13849-1:2006, 4.5.4 and Annex K); verification that the PL achieved by the [Safety-Related Parts of the Control System] SRP/CS satisfies the required performance level PLr in the safety requirements specification for the machinery: PL ≥ PLr."
T	OSHA 29 CFR 1910.145(a)(1): "These specifications apply to the design, application, and use of signs or symbols (as included in paragraphs (c) through (e) of this section) that indicate and, insofar as possible, define specific hazards that could harm workers or the public, or both, or to property damage."
U	OSHA 29 CFR 1910.218(a)(2)(ii): "Scheduling and recording the inspection of guards and point of operation protection devices at frequent and regular intervals. Recording of inspections shall be in the form of a certification record which includes the date the inspection was performed, the signature of the person who performed the inspection and the serial number, or other identifier, of the equipment inspected."
V	ISO 14119 (2013) Clause 8.2: "When a manual functional test is necessary to detect a possible accumulation of faults, it shall be made within the following test intervals: - at least every month for PL e with Category 3 or Category 4 (according to ISO 13849-1)" and "- at least every 12 months for PL d with Category 3 (according to ISO 13849-1)."

Protect Your Most Valuable Assets

Protecting your most valuable assets - your people - is important to you. Our portfolio of safety services can be tailored to meet your needs and help ensure the safe operation and maintenance of your equipment.

Consulting

- ▶ Corporate & plant safety initiatives
- ▶ Procedures & documentation support
- ▶ Machine safety training
- ▶ Accident or near miss response

Standards Compliance

- ▶ Regulatory requirements
- ▶ Regional standards
- ▶ Global standards
- ▶ Corporate & plant standards

Risk Assessment

- ▶ Plant risk classification
- ▶ Machine risk assessment
- ▶ Machine guarding assessment
- ▶ Energy isolation & lockout audit

Risk Reduction: Define & Design

- ▶ Functional design specification
- ▶ Safety system design
- ▶ Machine guarding design
- ▶ Automation & safety programming

Risk Reduction: Implement

- ▶ Integration services
- ▶ Hardware procurement
- ▶ Contractor management
- ▶ Installation & startup support

Validation

- ▶ New or modified equipment
- ▶ Machine guarding verification
- ▶ Safety system analysis
- ▶ Safety system validation

What are your next steps?

Polytron offers complete machine safety project delivery from functional specification to remediation; validation and start-up; through training for operators and maintenance to ensure that your workforce is able to safely operate the newly upgraded machine.

Contact us for a consultation.

