

The Law States

OSHA:

29 CFR

§ 1910.212 General requirements for all machines.

(a) Machine guarding – (1) Types of guarding

(3) Point of operation guarding (i)

Point of operation is the area on a Machine where work is actually performed upon the material being processed.

(ii) The point of operation of machines whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards.

Products or Services	EQUIPMENT AND MATERIALS USED IN THE WORKPLACE
Department/Agency	U.S. Department of Labor (DOL) Occupational Safety and Health Administration (OSHA) Directorate of Technical Support NRTL Program, Room 3653 200 Constitution Ave., NW Washington, DC 20210 Phone: (202) 219-7056 FAX: (202) 219-7068 e-mail: jennifer.silk@osha-no.osha.gov or bernard.pasquet@osha-no.osha.gov URL address: http: // www.osha-slc.gov/SLTC/NRTL/index.html
Initiated	<i>Federal Register</i> Notices dated April 12, 1988 pages 12102-12125 and supplemental requirements in notice dated March 9, 1995, pages 12980-12985
Compliance	Mandatory
Authority	Occupational Safety and Health Act of 1970, P.L. 91-596. 29 CFR Part 1910 – Occupational Safety and Health Standards for General Industry, Section 1910.7.
Aim	To provide protection to the nation's workers on their job by reducing or eliminating the various hazards to which workers may be exposed. Certain equipment because of its nature or the types of hazards that may develop while in use is required to be listed, labelled, or approved by third party laboratories accredited by OSHA.
Benefits	The accreditation or recognition program enables employers to install equipment which has demonstrated compliance with applicable product test standards. OSHA workplace inspections can also be expedited when certified equipment is used.
Methodology	Requires third party certification bodies to meet the strict criteria and requirements of competency and independence in 29 CFR 1910.7, including applicable international guides. Initial recognition is granted after the applicant completes a process that include: submission of a complete application; an on-site assessment; resolution by the applicant of deficiencies found during the assessment; publication of a preliminary notice in the <i>Federal Register</i> (FR) announcing the application for recognition, the proposed scope of recognition, the findings by OSHA, and any conditions of the recognition; a 60-day comment period; and then absent compelling reasons to the contrary, publication of a final FR notice to formally recognize the applicant as an NRTL.
Testing	Third party test/certification labs.
Inspection	OSHA inspectors can inspect equipment in the workplace.
Conformity Identification	Mark or label authorized by recognized NRTLs.
Obligations of the Manufacturer/Vendor	Comply with applicable standards. NRTLs must use appropriate product safety standards in testing products; test only products within their approved scope of recognition; and comply with other applicable requirements.
Enforcement	Citation of employer for using uncertified equipment
Term	Initial recognition is valid for 5 years
Reciprocity	Listing, labelling, or approval by foreign certification agencies is accepted by OSHA if the organization in question is recognized by OSHA as an NRTL. Eligibility for recognition of foreign organizations as NRTLs depends in part on whether the foreign countries are open to U.S. certifiers.
Standards, Codes or Regulations	OSHA standards include extensions of federal standards and federal and non-government standards incorporate reference. These include numerous standards of the American National Standards Institute, the American Society of Mechanical Engineers, the National Fire Protection Association, Underwriters Laboratories, international standards and guides, and others. OSHA standards are different from the product test standards used by the NRTL in certifying products.

106th CONGRESS

2d Session

S.3014

To amend title 18 of the United States Code to penalize the knowing and reckless introduction of a defective product into interstate commerce.

IN THE SENATE OF THE UNITED STATES

September 7, 2000

Mr. SPECTER introduced the following bill; which was read twice and referred to the Committee on the Judiciary.

A BILL

To amend title 18 of the United States Code to penalize the knowing and reckless introduction of a defective product into interstate commerce.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

SECTION 1. DEFINITIONS.

(a) A 'defective' product is one with a flaw in design, manufacture, assembly, or instruction which renders the product dangerous to human life and limb beyond the reasonable and accepted risk associated with such or similar products lacking such a flaw.

(b) To 'introduce' a product into the stream of interstate commerce is to manufacture, assemble, import, sell, or otherwise produce or transfer the product in question.

(c) 'Person' means the employees of any corporation, company, association, firm, partnership, or other business entity.

(d) 'Serious bodily injury' means bodily injury which involves--

(1) a substantial risk of death;

(2) extreme physical pain; or

(3) protected or impairment of the function of a bodily member, organ, or mental faculty.

SEC. 2. ENACTMENTS.

(a) A person who in gross deviation from a reasonable standard of care introduces into interstate commerce a product known by that person to be defective which causes the death of any individual shall be guilty of murder in the second degree and shall be imprisoned for a term of up to fifteen years.

(b) A person who in gross deviation from a reasonable standard of care introduces into interstate commerce a defective product which causes serious bodily injury to any individual shall be imprisoned for a term of up to 5 years.

DRIVE TO ENFORCE USE OF PROPER SAFETY MACHINE GUARDS

TORONTO--An **enforcement initiative** to dramatically improve safety for workers who are involved with machinery was announced today by Labour Minister Chris Stockwell.

Ministry of Labour inspectors will begin immediately to step up enforcement of safety violations involving machine guards and lockouts during all workplace inspections. They will use all enforcement tools necessary, including **stop work orders, fines and prosecutions**.

A guard is a device that prevents access to dangerous moving parts in a machine. A lockout prevents a machine from starting or moving while a worker is repairing it, or shuts off power to electrical panels or machinery to prevent electrocution.

"Encouraging the proper use of guards and lockouts will sharply reduce the rising number of fatalities and critical injuries among workers who are involved with machinery and make workplaces safer and more productive," Mr. Stockwell said. "Fatalities due to guarding and lockout violations totaled eight in 1999, including three young workers--up 100 per cent from the four recorded in 1997. Critical injuries, including a number of amputations, rose to 95 from 76 during the same period."

The drive will build on the success of other "zero tolerance" initiatives over the past two years that targeted safety violations involving fall protection and forklift trucks. In both initiatives, the ministry stepped up enforcement while safe workplace partners, such as the [Industrial Accident Prevention Association](#), provided training and assistance to help workplaces comply with ministry orders.

Where violations are found during the machine guards and lockout initiative, the ministry may:

- issue orders to comply and, if necessary, stop work orders;
- issue Part One Summonses with fines of up to \$500 to supervisors and/or workers who disable the protections or bi-pass them; and
- begin Part Three Prosecutions with **fines of up to \$500,000** for more serious offences such as condoning the above offences or ignoring orders to comply with guard and lockout laws.

"Machine guarding and lockout hazards continue to be a source of serious workplace injuries," Maureen Shaw, president and chief executive officer of the Industrial Accident Prevention Association (IAPA) said. "It is critical that employers and employees are aware of these hazards and take every possible measure to eliminate them and ensure workers' safety."

The ministry will monitor the number of fatalities and injuries that result from guarding and lockout violations to determine whether the initiative is successful.

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(Ce document est aussi disponible en français.)

Visit the Ministry of Labour World Wide Web at <http://www.gov.on.ca/LAB/main.htm>

(6) Subsection 29.1 (7) of the Regulation is amended by striking out “When toilets are provided as described in subsection (4)” and substituting “When toilets other than water flush toilets or non-recirculating chemical flush toilets are provided”.

3. Subsection 29.2 (1) of the Regulation is revoked and the following substituted:

(1) Each single-toilet facility shall be provided with its own clean-up facility.

(1.1) In a multiple-toilet facility at a project, one clean-up facility shall be provided for every two toilets.

4. Clause 135 (1) (c) of the Regulation is amended by striking out “section 86” and substituting “section 26.3”.

5. Subclause 153 (2) (b) (v) of the Regulation is amended by striking out “sections 85 and 86” and substituting “section 26.3”.

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ONTARIO REGULATION 528/00

made under the

OCCUPATIONAL HEALTH AND SAFETY ACT

Made: September 20, 2000

Filed: September 22, 2000

Amending Reg. 851 of R.R.O. 1990
(Industrial Establishments)

Note: Regulation 851 has previously been amended. Those amendments are listed in the Table of Regulations published in *The Ontario Gazette* dated January 22, 2000.

1. The heading to section 6 of Regulation 851 of the Revised Regulations of Ontario, 1990 is revoked and the following substituted:

RETENTION OF REPORTS AND RECORDS

2. Section 7 of the Regulation is revoked and the following substituted:

PRE-START HEALTH AND SAFETY REVIEWS

7. (1) In this section,

“apparatus” means equipment or a machine or device;

“protective element” means a shield, a guard, an operating control acting as a guard, a locking device or any other device preventing access;

“spray booth” means a spray booth as defined in Ontario Regulation 388/97 made under the *Fire Protection and Prevention Act, 1997*;

“Table” means the Table to this section.

(2) Subject to subsections (5), (7), (8) and (9), a pre-start health and safety review is required if, in a factory other than a logging operation, a provision of this Regulation listed in the Table applies and the circumstances described in the Table will exist,

(a) because a new apparatus, structure or protective element is to be constructed, added or installed or a new process is to be used; or

(b) because an existing apparatus, structure, protective element or

1. New or modified engineering controls are used.

2. Other new or modified measures are used.

3. A combination of new, existing or modified engineering controls and other new or modified measures is used.

(3) When a pre-start health and safety review is required, the owner, lessee or employer shall ensure that the apparatus, structure or protective element is not operated or used or that the process is not used, as the case may be, unless the review has been conducted, and,

(a) all measures identified in the review as being required for compliance with the relevant provisions of this Regulation that are listed in the Table have been taken; or

(b) if some or all of the measures specified in clause (a) are not taken, the owner, lessee or employer has provided written notice to the joint health and safety committee or the health and safety representative, if any, of what measures have been taken to comply with the relevant provisions of this Regulation that are listed in the Table.

(4) A pre-start health and safety review includes the preparation of a written report that is made to the owner, lessee or employer and contains,

(a) details of the measures to be taken for compliance with the relevant provisions of this Regulation that are listed in the Table;

(b) if testing is required before the apparatus or structure can be operated or used or before the process can be used, details of measures to protect the health and safety of workers that are to be taken before the testing is carried out; and

(c) if item 3 or 7 of the Table applies, details of the structural adequacy of the apparatus or structure.

(5) When item 2 of the Table applies, a pre-start health and safety review is not required if,

(a) the protective element was installed at the time the apparatus was manufactured and the conditions set out in paragraphs 1, 2 and 3 of subsection (6) are met; or

(b) the protective element was not installed at the time the apparatus was manufactured and the conditions set out in paragraphs 1, 2, 3 and 4 of subsection (6) are met.

(6) The following are the conditions mentioned in clauses (5) (a) and (b):

1. The apparatus was manufactured in accordance with and meets **current applicable standards**, or it has been modified to meet **current applicable standards**.

2. The apparatus is installed in accordance with the manufacturer's instructions and **current applicable standards**.

3. The protective element was manufactured in accordance with and meets **current applicable standards**, or it has been modified to meet **current applicable standards**.

4. The protective element is installed in accordance with the manufacturer's instructions, and **current applicable standards**, if any.

(7) When item 3 of the Table applies, a pre-start health and safety review is not required if the rack or stacking structure is designed and tested for use in accordance with current applicable standards.

(8) When item 4 of the Table applies, a pre-start health and safety review is not required if the process is conducted inside a spray booth

process is to be modified and one of the following steps must be taken to obtain compliance with the applicable provision:

that is manufactured and installed in accordance with current applicable standards.

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O. Reg. 528/00 1711

(9) When item 7 of the Table applies, a pre-start health and safety review is not required,

(a) in the case of a lifting device or travelling crane, if it is in or on a supporting structure originally designed for it and its capacity does not exceed the capacity provided for in that original design;

(b) in the case of an automobile hoist, if it is certified that it meets current applicable standards.

(10) If no pre-start health and safety review is required because subsection (5), (7), (8) or (9) applies, the owner, lessee or employer shall keep documents establishing the exemption readily accessible in the workplace for as long as the protective element, rack or stacking structure or lifting device, travelling crane or automobile hoist remains in the workplace or the process is used in the workplace, as the case may be.

(11) A pre-start health and safety review required under item 1, 2, 3, 4, 5, 6 or 7 of the Table shall be conducted by a professional engineer.

(12) A pre-start health and safety review required under item 8 of the Table shall be conducted by a professional engineer or by a person who in the opinion of the owner, lessee or employer possesses special expert or professional knowledge or qualifications appropriate to assess any potential or actual hazards.

(13) The person conducting a pre-start health and safety review shall,

(a) date and sign the written report mentioned in subsection (4);

(b) if the person is a professional engineer, affix his or her seal to the report; and

(c) if the person is not a professional engineer, include in the report details of his or her special expert or professional knowledge or qualifications.

(14) Reports of pre-start health and safety reviews conducted under this section shall,

(a) be kept readily accessible in the workplace together with any supporting documents; and

(b) be provided to the joint health and safety committee or the health and safety representative, if any, before the apparatus, structure or protective element is operated or used or the process is used.

(15) Documents kept under subsection (10) may be reviewed, on request, by,

(a) the joint health and safety committee or the health and safety representative, if any; or

(b) an inspector.

TABLE

	Applicable provisions of this Regulation	Circumstances
1.	Subsections 22 (1), (2) and (4)	Flammable liquids are located or dispensed in a building, room or area.
2.	Sections 24, 25, 26, 28, 31 and 32	Any of the following are used as protective elements in connection with an apparatus: 1. Safeguarding devices that signal the apparatus to stop, including but not limited to safety light curtains and screens, area scanning safeguarding systems, radio frequency systems and capacitance safeguarding systems, safety mat systems, two-hand control systems, two-hand tripping systems and single or multiple beam systems. 2. Barrier guards that use interlocking mechanical or electrical safeguarding devices.
3.	Clause 45 (b)	Material, articles or things are placed or stored on a structure that is a rack or stacking structure.
4.	Section 63	A process involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety.
5.	Section 65	The use of a dust collector involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety.
6.	Sections 87.3, 87.4, 87.5 and 88, subsections 90 (1), (2) and (3), and sections 91, 92, 94, 95, 96, 99, 101 and 102	A factory produces aluminum or steel or is a foundry that melts material or handles molten material.
7.	Sections 51 and 53	The construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist.
8.	Sections 127 and 128	A process uses or produces a substance that may result in the exposure of a worker in excess of any occupational exposure limit set out in Regulation 833, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845 or 846 of the Revised Regulations of Ontario, 1990.

A Compendium of:

Ontario Regulation 528/00
Effective October 7, 2000

“Pre-Start Health and Safety Reviews”

- Who: Applies to all manufacturing facilities (except logging operations) and all machine suppliers
- What: Documented Safety Review for new and existing machines
- Where: Directly effects all Ontario manufacturers
: Indirectly effects cross boarder operations
: Directly effects all machine suppliers
- When: Now!
- How: Machine safety must comply to “Current Applicable Standards”

Introduction

The following is a compendium of the requirements, put forth in Ontario Regulation 528/00, as it applies to safeguarding machines. This regulation deals with 8 specific health and safety topics of particular concern to the Ministry of Labor. One of the specific safety concern is machine safeguarding. This compendium only addresses Machine Safeguarding with particular, emphasis focused on safeguarding the point of operation using light curtains.

This document should not be used as a substitute for Ontario Regulation 528/00 and Pre-start Health and Safety Review Guidelines. The Regulation is best read in its entirety for full comprehension of all requirements.

To order Regulation 528/00 and Guideline

Ministry of Labor
400 University Avenue 7th Floor
Toronto, ON M7A 1T7

Telephone #: 416-326-7770

The compendium also incorporates some safety aspects of other safety standards where their usage helps clarify a requirement or concept. Other standards are:

- IEC-61496-1 & 2 Safety of Machinery Electro Sensitive Protective Equipment
- IEC-62046 (draft) Safety of Machinery – Application of Presence Sensing Protective Equipment (PSPE) to Machinery
- IEC-61508 ('00) Functional Safety – Safety Related Control Systems
- ISO-12100-1 & 2 ('00) Safety of Machinery – Basic Concepts, general principle for design.
- ISO-14121 Safety of Machinery – Principles of Risk Assessment

I. Ontario Regulation 528/00 states

Synopsis

(2) Subject to subsections (5), (7), (8) and (9), a pre-start health and safety review is required if, in a factory, a provision of this Regulation **listed in the Table applies** and the circumstances described in the Table will exist,

The 'Table' identifies the Health and Safety concerns that must be reviewed. Item 2 of the 'Table' specifies machine safeguarding devices (see below). Subsection 5 provides the exception as to when a review is not required.

(a) because a new apparatus, structure or protective element is to be constructed, added or installed or a new process is to be used; or

(a) Applies to all new machinery and/or new safeguards being commissioned

(b) because an existing apparatus, structure, protective element or process is to be modified and one of the following steps must be taken to obtain compliance with the applicable provision:

(b) Applies to all existing machines and their protective measures (i.e. engineering controls such as light curtains) that require being modified to bring it into compliance. Subsection 5, sets forth the rules when the machine and protective measure(s) are exempt from the 'Health and Safety Review'.

1. New or modified engineering controls are used.
2. Other new or modified measures are used.
3. A combination of new, existing or modified engineering controls and other new or modified measures is used.

Table

	Applicable provisions of this Regulation	Circumstances
1	Subsections 22 (1), (2) and (4)	Flammable liquids are located or dispensed in a building, room or area
2	Sections 24, 25, 26, 28, 31 and 32	Any of the following are used as protective elements in connection with an apparatus: <ol style="list-style-type: none"> 1. Safeguarding devices that signal the apparatus to stop, including but not limited to safety light curtains and screens, area scanning safe-guarding systems, radio frequency systems and capacitance safe-guarding systems, safety mat systems, two-hand control systems, two-hand tripping systems and single or multiple beam systems. 2. Barrier guards that use inter-locking mechanical or electrical safeguarding devices.

II. Qualification for Existing Machine Exemption

Synopsis

<p>(5) When item 2 of the Table applies, a pre-start health and safety review is not required if,</p>	<p>Item 2 of the 'Table' applies to safeguarding machines</p>
<p>(a) The protective element was installed at the time the apparatus was manufactured and the conditions set out in paragraphs 1,2 and 3 of subsection (6) are met; or</p>	<p>A Health and Safety Review is not required if the machine was supplied with the safeguarding devices and "meets current applicable standards" and the user obtains documentation of compliance (see Guideline: next page)</p>
<p>(b) the protective element was not installed at the time the apparatus was manufactured and the conditions set out in paragraphs 1,2,3, and 4 of subsection (6) are met.</p>	<p>A Health and Safety Review is not required if the machine was retrofitted with safeguarding devices and "meets current applicable standards" and was installed in accordance to the manufacturer's instructions (see Note 1)</p>
<p>(6) The following are the conditions mentioned in clauses (5) (a) and (b):</p> <ol style="list-style-type: none"> 1. The apparatus was manufactured in accordance with and meets current applicable standards, or it has been modified to meet current applicable standards. 2. The apparatus is installed in accordance with the manufacturer's instructions and current applicable standards. 3. The protective element was manufactured in accordance with and meets current applicable standards, or it has been modified to meet current applicable standards. 4. The protective element is installed in accordance with the manufacturer's instructions, and current applicable standards, if any. 	<p>If the machine and it's protective devices "meet all current applicable standards" of which one is a "Documented Risk Assessment and Hazard Abatement Means" then that will suffice for the "Health and Safety Review"</p> <p>However, the protective devices must be to the current applicable standards (see Note 2)</p>
<p>(10) If no pre-start health and safety review is required because subsection (5), (7), (8) or (9) applies, the owner, lessee or employer shall keep documents establishing the exemption readily accessible in the workplace for as long as the protective element, rack or stacking structure or lifting device, travelling crane or automobile hoist remains in the workplace or the process is used in the workplace, as the case may be,</p>	<p>The Risk Assessment Documentation must be kept for the life of the machine</p>
<p>(15) Documents kept under subsection (10) may be reviewed, on request, by,</p> <ol style="list-style-type: none"> (a) The joint health and safety committee or the health and safety representative, if any; or (b) An inspector 	<p>The Risk Assessment is the audit trail whereby:</p> <ul style="list-style-type: none"> • All hazards are addressed • All hazard abatement means are specified • Where 'engineering controls' are used for abatement, they must be designed and built to meet "Current Applicable Standards" (see Note 3)

Pre-Start Health and Safety Review Guidelines

States:

Chart 1 – Decision Tree for existing equipment

1	Was a Pre-Start Health and Safety Review carried out when the apparatus, structure, protective element, or process was originally installed or was an exemption documented?	Yes	Go to 3
		No	Go to 2
2	Is the apparatus, structure, protective element, or process currently in compliance with the <i>Regulations for Industrial Establishments</i>	Yes	Go to 3
		No	Pre-Start Health and Safety Review required
3	Are the modifications to the apparatus, structure, protective element, or process such that new or modified engineering controls or other measures would be required to comply with the applicable provisions of the <i>Regulations for Industrial Establishments</i> ?	Yes	Pre-Start Health and Safety Review required
		No	Pre-Start Health and Safety Review not required

If no Pre-Start Health and Safety Review is required due to the above exemption, the owner, lessee or employer must keep documents supporting the exemptions. The following documents are acceptable in establishing such an exemption:

- A notice in writing from the manufacturer, or certification from an accredited organisation, declaring that the apparatus and protective element conform to *current applicable codes and standards*, AND
 - A notice in writing from the installer stating that the apparatus and protective element were installed in accordance with the manufacturer's instructions and *current applicable codes and standards*
- AND, if the protective element was NOT installed at the time the apparatus was manufactured:**
- A notice in writing from the installer stating that the protective element is installed in accordance with the manufacturer's instructions and current applicable codes and standards, if any

What is meant by current applicable codes and standards?

All standards listed in Appendix I

III. Current Applicable Standard(s)

Appendix I – Recognised Standards

The following partial list of standards, codes and legislation is provided to assist professional engineers and others responsible for conducting Pre-Start Health and Safety Reviews. **Professional engineers are responsible for familiarising themselves with these and any other relevant documents.** Where reference is made to a specific act, code, or regulation, the version effective at the time this guideline was published has been used. Persons performing Pre-Start Health and Safety Reviews are advised to contact the appropriate ministry to ensure that they are using the latest versions of these documents.

Synopsis

To understand what the Ministry of Labor means by “Current Applicable Standards” one has to review the:

“Guideline on the application of section 7 of the regulations for Industrial Establishments regarding Pre-Start Health and Safety Reviews”

Standard	Subject	
TYPE A Standards:	Define fundamental concepts and general design principles that apply to all types of machinery	For machine safeguarding methodology the Ministry of Labor sites the International 'A' Standards, including: <ul style="list-style-type: none"> • ISO-12100-1&2 – Safety of Machinery: Basic Concepts • ISO-14121 – Safety of Machinery: Risk Assessment • IEC-61508 (part 1-7) Functional Safety of the Safety Control System
ISO-12100-1&2	Safety of machinery: Basic concepts, general principles for design	
ISO-14121	Safety of machinery: Principles of Risk assessment	
IEC-61508	Safety Related Systems – General Requirements...etc	
Type B Standards:	Are concerned with a particular aspect of safety and applicable to most machinery.	For machine safeguarding devices and application of those devices the Ministry of Labor sites the International 'B' standards, including: <ul style="list-style-type: none"> • ISO-13851 – Two Hand Controls • ISO-14118 – Prevention of unexpected start-up • IEC-61496-1&2 – Electro Sensitive Protection Equipment
ISO-13852	Safety distances to prevent danger zones from being reached by upper limbs	
ISO-13854	Minimum gaps to avoid crushing of parts of the human body	
ISO-13853	Safety distances to prevent danger zones from being reached by lower limbs	
ISO-13849-1&2 (EN 954-1&2)	Safety related parts of control systems Part 1&2	
ISO-13855	Hand/arm speed – approach speeds of the human body for positioning protective equipment	
IEC-60204-1 IEC 1131 (7parts)	Electric equipment of machines	
ISO 13850	Emergency stop equipment	
ISO 13851	Two hand control devices	
ISO 14120	General requirements for the design and construction of guards	
ISO 14118	Prevention of unexpected start up	
ISO 14119	Interlocking devices with an without guard locking	
ISO 13856 (4parts)	Pressure sensitive protective devices	
EC 60947 5; 5-1; 5-2; 5-3	Low voltage switch gear and control gear; Electromechanical control circuit devices; Proximity devices; Proximity devices with defined behavior under fault conditions;	
IEC/EN 61496 Part 1&2	Part 1: Electro sensitive protective equipment – Sensing Safeguards Part 2: and Active Opto Electronic protective devices – Light curtains	

IV. Proof of Compliance

Synopsis

<p>(11) A pre-start health and safety review required under item 1, 2, 3, 4, 5, 6 or 7</p>	<p>For machines, a professional engineer is required to conduct the Health and Safety Review due to being listed as item 2 of the 'Table'</p>
<p>(12) A pre-start health and safety review required under item 8 of the Table shall be conducted by a professional engineer or by a person who in the opinion of the owner, lessee or employer possesses special expert or professional knowledge or qualifications appropriate to assess any potential or actual hazards.</p>	<p>Only item 8 of the 'Table' permits the Health and Safety Review to be conducted by non-professional engineers</p>
<p>(13) The person conducting a pre-start health and safety review shall,</p> <p>(a) date and sign the written report mentioned in subsection (4);</p> <p>(b) if the person is a professional engineer, affix his or her seal to the report; and</p> <p>if the person is not a professional engineer, include in the report details of his or her expert or professional knowledge or qualifications.</p>	<p>Subsection 66(1) of the <i>Occupational Health and Safety Act</i>.</p> <p>"Every person who contravenes or fails to comply with</p> <p>(a) a provision of this Act or the Regulations;</p> <p>(b) an order or requirement of an inspector or a Director; or</p> <p>(c) an order of the Minister</p> <p>is guilty of an offence and on conviction is liable to a fine of not more than \$25,000 or to imprisonment for a term of not more than twelve months, or both"</p>
<p>(14) Reports of pre-start health and safety reviews conducted under this section shall,</p> <p>(a) be kept readily accessible in the workplace together with any supporting documents; and</p>	<p>The Health and Safety Review must be kept for the life of the machine</p>
<p>(b) be provided to the joint health and safety committee or the health and safety representative, if any, before the apparatus, structure or protective element is operated or used or the process is used.</p>	<p>The Health and Safety Review must be submitted prior to using the machine and/or protective device</p>

Note 1: Requirement

“Installed in Accordance to the Manufacturer’s Instructions”

I. Not in Compliance with Annex A of IEC-61496-1

Few light curtains are installed according to the manufacturer’s instructions. This is because most light curtain manufacturers are transferring the onerous requirements put forth in Annex A of the product standard (i.e. IEC-61496-1) to the user. This occurs by the manufacturer designing the light curtain to the minimum requirements of IEC-61496 (for certification purposes) resulting in a **“front end sensor”** then transferring, by way of “warnings”, in their instruction manuals the balance of the requirements in Annex ‘A’. This can be done because the light curtain manufacturer is not mandated to supply these additional functions, yet the manner in which the light curtain is used may mandate the function(s) be implemented. However, most integrators of light curtains do not consult the product standard for knowledge of what is required.

Annex ‘A’ specifies the functions of:

- A.2 External Device Monitoring function
(includes monitoring of all safety related peripheral devices)
 - Final Switching Devices (FSDs) i.e. output relays for stopping
 - Machine Primary Control Element(s) (MPCEs) i.e. valves for stopping
 - Mute Input Signals i.e. position sensors
 - Stopping Performance Inputs i.e. motion detectors
 - Secondary Switching Device – emergency stop
 - Start Interlock i.e. actuator state for start-up
 - Restart Interlock i.e. actuator state for restart
- A.3 Stopping Performance Monitoring (SPM) function
i.e. temporal monitoring for cessation of motion
- A.4 Secondary Switching Device (SSD) function
i.e. creates the lockout condition
i.e. the SSD must undergo a start test at power on and before light curtain’s outputs go to ‘ON’ state
- A.5 Start Interlock function
i.e. prevents the light curtain’s outputs going to ‘ON’ state until manual actuation of switch
i.e. performed at power-on, after start test is successfully completed
i.e. actuation cannot result in light curtain’s outputs going to ‘ON’ state when in lockout condition
- A.6 Restart Interlock function
i.e. prevents the light curtain’s outputs from going to ‘ON’ state when the detection zone is interrupted (during hazardous motion) and then restored
i.e. reset function must be aborted if the light curtain is interrupted
- A.7 Mute function
i.e. light curtains outputs must not go to ‘OFF’ state when the detection zone is interrupted during mute condition

Note: this is to prevent bypassing a safety device by bridging its output(s)
i.e. disconnect of mute inputs (mute start/mute end) must not allow mute condition
- A.8 Presence Sensing Device Initiation (PSDI)
i.e. requires functions of; Mute, Start Interlock, Restart Interlock, External Device Monitoring, Secondary Switching Device, Stopping Performance Monitoring
i.e. requires 30 sec. time out if light curtains’ detection zone is not interrupted

[Also See: “ Why Front End Sensors Don’t Work for Point of Operation Safeguarding”]

Note 2: Not in Compliance with Nearby Reflective Surface Warning

Most light curtain manufacturers warn against placing the light curtain's detection field near any surface that could reroute a light beam around a finger, hand, arm etc. Most light curtain manufacturers specify the **closest** one can mount their light curtain to a surface is 100mm (4.1") [200mm (8.2") for TYPE 2 light curtains]. The separation distance to nearby surface(s) increases based on the transmission length of the detection field due to conical expansion of the light beams. Because a light beam pattern is conical the nearby surface(s) include; in front of, in back of, above and below the detection zone. For point of Operation application light curtains are generally installed where as the beam(s) closest to the working surface are in violation i.e. closer than 100mm (4.1"). If they are moved upward to satisfy the 100 mm (4.1") requirement there is then a gap that one can reach under to the hazard area. This gap would require additional guarding.

Note: surfaces that can reroute infrared light are most any type or could become such should oil, water or other contaminates adhere to them.

(Also see Overcoming the Inherent Safety Flaws of Light Curtains in Blue Book)

Note 2: Requirement

“Protective Element Must Meet Current Applicable Standards”

Few light curtains meet the rigorous safety requirements set forth for a 'TYPE 4' safety level in the light curtain product standard IEC-61496-1&2. Fewer light curtains meet the requirements for a TYPE 4 safety device to IEC-61496-1&2 with Annex 'A' functions (see Note 1)

This standard (for a 'TYPE 4' light curtain) requires fault detection to occur immediately i.e. within the response time of the device –50mS. Where the additional functions of Annex 'A' are implemented they are subject to the same requirements.

'TYPE 4' light curtains are required for all point of operation safeguarding. Independent 3rd party certification by an authorized laboratory should be required from the manufacturer stating compliance to:

IEC-61496-1; IEC-61496-1 Annex 'A' functions, and IEC-61496-2.

Note: Independent 3rd party certification by an authorized body is required for light curtains in Europe and should be available upon request.

Note: prEN50100-1&2 is not equivalent to IEC-61496-1&2
(prEN50100-1&2 was a defective standard corrected at the IEC)

(Also see Major Differences prEN50100-1&2 vs. IEC-61496-1&2 see attached)

Note 3: Requirement

“ISO-14121 Safety of Machinery – Principles of Risk Assessment is Listed in Appendix I as a Recognised Standard”

The Risk Assessment is a written document that is to be supplied with the machine. It is to identify all hazards, for all tasks performed on the machine, over its life cycle, and to specify the method(s) in which the hazard has been abated.

Where ‘engineering controls’ i.e. protective devices, are used to neutralize a hazard their safety integrity level must be commensurate with the level of risk associated with the hazard(s); taking into consideration the worst case scenario. [Point of operation safeguarding requires TYPE 4 light curtain]. To establish that the protective device(s) realizes its intended safety integrity level it must be independent 3rd party certified by an authorized body deemed competent in the field of expertise by a governmental body and must be approved to a current applicable standard.

- ISO-13850 Emergency Stop Equipment
- ISO-13851 Two-Hand Control
- ISO-14120 Guards
- ISO-14118 Enabling Device
- ISO-13856 Safety Mats
- ISO-61496-1&2 Light Curtains

(Also see A Compendium of: The Risk Assessment When Safeguarding Machine's Point of Operation Using Light Curtains in Blue Book)

**Guideline on the application of section 7 of
the Regulations for Industrial
Establishments, regarding Pre-Start Health
and Safety Reviews**

For more information: www.gov.on.ca/