

Guidelines for Pre-Start Health and Safety Reviews: How to Apply Section 7 of the Industrial Establishments Regulation

Issued: November 23, 2016

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Table of Contents

- [Introduction](#)
- [Purpose of These Guidelines](#)
- [Section 7](#)
 - [Circumstances Described in the Section 7 Table](#)
- [The Pre-Start Health and Safety Review Report](#)
- [The Reviewer Carrying Out a Pre-Start Health and Safety Review](#)
- [Joint Health and Safety Committees and Health and Safety Representatives](#)
- [Applicable Regulations, Codes and Standards](#)
- [Appendix I: Recognized Standards](#)
- [Appendix II: Glossary of Acronyms and Organizations](#)

[Next](#)

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Disclaimer: This web resource has been prepared to assist the workplace parties in understanding some of their obligations under the [Occupational Health and Safety Act \(OHS Act\)](#) and the regulations. It is not intended to replace the OHS Act or the regulations and reference should always be made to the official version of the legislation.

It is the responsibility of the workplace parties to ensure compliance with the legislation. This web resource does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.

While this web resource will also be available to Ministry of Labour inspectors, they will apply and enforce the OHS Act and its regulations based on the facts as they may find them in the workplace. This web resource does not affect their enforcement discretion in any way.

Introduction

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The Guidelines for Pre-Start Health and Safety Reviews have been prepared to provide information to assist workplace parties in understanding their obligations, the levels of diligence, methodology and reporting required to comply with the Occupational Health and Safety Act (OHSA), and Section 7 of the Industrial Establishments Regulation, Revised Regulations of Ontario 1990, Regulation 851. It is not intended to replace the OHSA or the regulations and reference should always be made to the official version of the legislation.

You may view the Industrial Establishments Regulation on the e-Laws website. It is the responsibility of the workplace parties to ensure compliance with the legislation or its regulations. This guideline does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation or its regulations and its potential application in specific circumstances, please contact your legal counsel.

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Workplace parties need to consider the following points:

- All requirements of the OHSA and regulations must be complied with in the workplace. Where a pre-start health and safety review (PSR) is not required or an exemption from the requirements of Section 7 applies, the employer must ensure that workers will be protected when they use any apparatus, structure, protective element or process in the workplace.
- The section 7 table from the Industrial Establishments Regulation specifies the provisions of the regulation that apply and circumstances under which a PSR is required. There may be other compliance requirements that need to be met before any apparatus, protective element, structure and/or process is used. Even if a PSR is not required, it is still the employer's responsibility to meet these other requirements. To avoid a costly retrofit the employer may broaden the scope of a regulated PSR to include these other requirements.
- Integrating health and safety early – at the design stage and before the equipment is used – is a cost-effective and proactive way to prevent workplace illness or injury. The benefits are numerous, including direct savings from minimizing retrofitting; less downtime and replacement of equipment; savings in workplace insurance claims due to fewer illnesses and injuries; and, most importantly, maintaining health and safety in the workplace.
- These guidelines do not set out how a PSR is to be carried out. The regulation allows for flexibility in that it does not specify any one report format. Where employers have existing review systems and processes to comply with health and safety requirements prior to start-up, they may use them to satisfy PSR requirements, provided that the evaluation, review and written report are done by an appropriate person as required in subsections 7(11) and (12) of the Industrial Establishments Regulation.
- A PSR includes a written report that outlines all areas of non-compliance and the measures necessary to achieve compliance (steps, actions or engineering controls as required by subsection 7(4)).
- The employer must ensure that the apparatus, structure, protective element or process complies with the applicable sections of the Industrial Establishments Regulation.

[Previous](#) | [Next](#)

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Purpose of these Guidelines

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The purpose of these guidelines is to clarify the intent and the requirements of section 7 of the Industrial Establishments Regulation regarding pre-start health and safety reviews. Within these guidelines, the term “pre-start health and safety review” includes a written report as required by section 7 of the Industrial Establishments Regulation.

The requirements set out in section 7 apply only to factories as defined by the Occupational Health and Safety Act (OHSA).

Factory is defined in section 1 of OHSA as follows:

- (a) a building or place other than a mine, mining plant or place where homework is carried on, where,
 - (i) any manufacturing process or assembling in connection with the manufacturing of any goods or products is carried on,
 - (ii) in preparing, inspecting, manufacturing, finishing, repairing, warehousing, cleaning or adapting for hire or sale any substance, article or thing, energy is,
 - (A) used to work any machinery or device, or
 - (B) modified in any manner,
 - (iii) any work is performed by way of trade or for the purposes of gain in or incidental to the making of any goods, substance, article or thing or part thereof,
 - (iv) any work is performed by way of trade or for the purposes of gain in or incidental to the altering, demolishing, repairing, maintaining, ornamenting, finishing, storing, cleaning, washing or adapting for sale of any goods, substance, article or thing, or
 - (v) aircraft, locomotives or vehicles used for private or public transport are maintained,
- (b) a laundry including a laundry operated in conjunction with,
 - (i) a public or private hospital,
 - (ii) a hotel, or
 - (iii) a public or private institution for religious, charitable or educational purposes, and
- (c) a logging operation.

Please note: even though “logging operations” are captured under the definition of “factory” they are not subject to the requirements of section 7 of the Industrial Establishments Regulation under the OHSA, as specified in subsection 7 (2).

Logging is defined in section 1 of OHSA as follows:

“logging” means the operation of felling or trimming trees for commercial or industrial purposes or for the clearing of land, and includes the measuring, storing, transporting or floating of logs, the maintenance of haul roads, scarification, the carrying out of planned burns and the practice of silviculture.

You may wish to read all of the definitions as they appear in the Act by referring to the OHSA at the [Ontario government's e-laws site](#).

Intent of section 7

Section 7 of the Industrial Establishments Regulation sets out requirements to ensure that a timely professional review identifies specific hazards, or hazards associated with the specified sections of the regulation.

Section 7 is intended to ensure that such hazards are removed or controlled before the apparatus or process is started up. The pre-start health and safety review ends when the apparatus or process is started up.

Effective date

Section 7 became effective on October 7, 2000. If a pre-development review was done prior to this date, then another review would not be necessary, unless there were modifications to an existing machine, equipment, device, structure, protective element or process or such modifications were planned. These guidelines will assist in making that determination.

Please note that not all modifications require review. For details, please refer to the questions and answers in the next section regarding existing equipment.

[Previous](#) | [Next](#)

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Section 7

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There are a number of terms used in section 7 which are defined in the Industrial Establishments Regulation:

"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 O. Reg. 213/07 (Fire Code) made under the Fire Protection and Prevention Act, 1997;

For the purpose of these guidelines, the table in section 7 of the regulation is referred to as the "section 7 table."

These guidelines frequently refer to sections of the Industrial Establishments Regulation. Where the reference is to the Industrial Establishments Regulation, the regulation will not be named. However, in all cases where the reference is to another regulation or Act, this will be specified.

What is a pre-start health and safety review?

A pre-start health and safety review (PSR) is an in-depth examination of an apparatus, structure, protective element or process identified in the section 7 table that is undertaken to identify any potential or existing non-compliance with the applicable provisions of the Industrial Establishments Regulation (as listed in the section 7 table). The PSR includes a written report that outlines all areas of non-compliance and the measures necessary to achieve compliance (steps, actions or engineering controls).

A new apparatus, structure, protective element or process includes a newly installed or added apparatus, structure, protective element or process in the workplace.

For the purpose of this section, the term "process" refers only to those processes listed and identified in the table found in section 7 of the Industrial Establishments Regulation under items 4 and 8.

When is a pre-start health and safety review required?

A pre-start health and safety review is required when the specific sections of the Industrial Establishments Regulation and the circumstances listed in the section 7 table apply.

Section 7(2) reads:

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

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.

Is an evaluation the same as a PSR?

No. An evaluation is not a pre-start health and safety review, but merely a way of determining whether a PSR is required. For this reason, the person conducting the evaluation is not required to be a professional engineer. However, the persons should be competent as defined by the Occupational Health and Safety Act (OHSA).

The employer should have a process in place to ensure that an evaluation is conducted to determine whether a PSR is required on the modification, or establish the process through documentation.

What are "new or modified measures?"

According to paragraph 2 of clause 7(2)(b), "new or modified measures" may be taken to achieve compliance with the regulation. In the context of section 7 "new or modified measures" are those "measures" referred to in section 87.3 of the Industrial Establishments Regulation regarding molten material. These "measures" are to be used in a foundry if engineering controls to prevent spillage are not reasonably possible in the circumstances. This is the only section of the regulation noted in the "Applicable Provisions of this Regulation" column of the section 7 table that refers to "measures".

What about modifications to existing equipment?

There are several steps to consider if the employer is planning modifications to an existing apparatus, structure, protective element or process and the provisions and circumstances in the section 7 table apply.

If one of the three steps described in clause 7(2)(b) of the regulation must be taken to achieve compliance, then a PSR is required.

Note that if there is a lack of compliance due to intended modifications, but engineering or other control measures would restore compliance, a PSR would still be required before an apparatus, structure, protective element or process is used. This requirement is subject to the exemptions specified in the regulation.

Is a PSR required in laundry facility in a hospital?

Yes. Generally, the Regulation for Industrial Establishments (Regulation 851) applies to all industrial establishments (section 3, Regulation 851), and PSR requirements apply to all factories other than logging operations.

Factory is defined in the OHSA and includes, amongst other workplaces, a laundry facility, including a laundry facility operated in conjunction with a public or private hospital.

Please note that the Health Care and Residential Facilities Regulation (O. Reg. 67/93) also applies to laundry facilities located in health care facilities, including public and private hospitals, and would apply in the event of a conflict with the Industrial Establishments Regulation. Of note, section 2(2) of that regulation provides as follows:

2(2) At a laundry facility to which this Regulation applies, if the regulations under the OHSA relating to industrial establishments conflict with this regulation, this regulation prevails unless the provision in that other regulation states that it is to prevail over this regulation

While there does not appear to be any conflict between the PSR requirements and O. Reg. 67/93, if you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.

What is the difference between maintaining an apparatus, structure, protective element or process and modifying it?

Maintenance is intended to capture activities/work on an apparatus, structure, protective element or process that restore it to its original state as designed and installed.

A PSR is not required for maintenance tasks.

Modification means activities or work on an apparatus, structure, protective element or process that changes it from its design and installation parameters.

Modifications may require a PSR, subject to any exemptions that may apply. In order to determine if a PSR is required for modifications to existing equipment, answer the following question:

Are the modifications to the apparatus, structure, protective element, or process such that new or modified engineering controls or other new or modified measures would be required to comply with the applicable provisions of the Industrial Establishments Regulation?

If the answer to this question is yes, then a PSR is required.

However, even when a PSR is required, there still may be exemptions available for guarding as outlined in subsections 7(5) and 7(6) of the Industrial Establishments Regulation. If one of these exemptions is being claimed or considered, the documents to establish the exemption must be available.

If the documents are not readily accessible in the workplace, then there is no exemption from the requirement to carry out a PSR.

What if a series of equipment is tied together – such as a tank and a pump. If one is not in compliance and the other part is, would a PSR be required?

PSRs can be carried out for processes or for specific equipment, depending on what section of the section 7 table is triggering the PSR. When a PSR is required and no exemption is applicable, whether the equipment is attached to other equipment or not, then a PSR is required.

To set the boundaries of the equipment covered by the PSR, one is required to look at the trigger for the PSR. For example, if the trigger is a process which may explode, then the PSR must include all the equipment involved in the process that may cause the explosion, as well as the equipment that may prevent the explosion or that may minimize damage if there is an explosion.

If a part is being replaced with an identical part, would a PSR be required?

No. In this case, the replacement of one part with an identical part would be considered maintenance, which does not require a PSR.

If a part is being replaced with an upgraded part, would a PSR be required?

Reference must be made to the requirements in clause 7(2)(b) of the regulation. If the replacement part results in the need for the use of new or modified engineering controls, other new or modified measures, or the use of a combination of new, existing or modified engineering controls and other new or modified measures, then a PSR is required.

Note: if there is an existing PSR, the author of the original PSR could simply update the existing PSR.

Can a recognized European standard be considered current and applicable?

A PSR is required according to the requirements in section 7 of the regulation. Section 7 references "current and applicable standards." If a piece of equipment meets a recognized European standard, a professional engineer licensed in Ontario must look at the standard in question to determine if following the standard achieves compliance with section 7 of the Industrial Establishments Regulation. If the review indicates that the standard meets the requirements, the professional engineer must be prepared to certify that it does so in writing.

Is a PSR required when equipment is moved?

A PSR would not be required if the equipment being moved to a new location:

- is within the same workplace
- meets the requirements set out in the section 7 table, and
- is not being changed in any way, and
- does not, because of the new location, introduce any new hazards.

However, a PSR would be required if:

- the equipment is moved to a different workplace, or
- the equipment is not currently in compliance with the Industrial Establishments regulation, or
- as a result of changes in the process existing controls must be modified or new controls added to be in compliance with the requirements set out in the section 7 table, or
- if the new location introduces an additional hazard.

Is a PSR required on existing equipment?

If a PSR was carried out or if the exemption was documented when the apparatus, structure, protective element or process was originally installed a PSR would not be required.

Note: if there have been modifications to the existing apparatus, structure, protective element, or process such that new or modified engineering controls or other new or modified measures would be required to comply with the applicable provisions of the Industrial Establishments Regulation, a PSR may be required.

Are there exemptions from the pre-start health and safety review requirement?

Yes. Even where there is a new apparatus, structure, protective element or process, or one that is intended to be modified, a pre-start health and safety review may not be required, depending on certain criteria. These criteria can be found in subsections 7(5) through (9).

What must be done with the documents establishing exemptions?

Subsection 7(10) requires that the documents establishing the exemption be kept 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 for as long as the process is used.

Subsection 7(15) requires the documents to be made available for review, upon request, to the Joint Health and Safety Committee or Health and Safety Representative, if any, or to a Ministry of Labour inspector.

What if I find that there are other compliance issues which are outside of the scope of the PSR?

If the employer does not have an effective process in place to assess other compliance issues and incorporate them into design and installation, broadening the scope of the pre-start health and safety review to include these issues would help ensure compliance and avoid costly retrofit.

In such cases, the reviewer should identify requirements to comply with all related sections of the Industrial Establishments Regulation not specified in the section 7 table. A related section is one that directly relates to the particular circumstance listed in the section 7 table.

Do the standards to which the apparatus has been built and installed have to be specifically stated on the exemption documentation? Neither the guideline nor regulation states this to be a requirement.

It is recommended that the standards be stated in the exemption document. This would assist all workplace parties in future reviews, and would also assist the Joint Health and Safety Committee or Health and Safety Representative and the Ministry of Labour inspector who may request the documentation.

I am a supplier of equipment that may require a PSR. Am I required to provide a PSR to the employer purchasing the equipment?

It is the employer who must comply with the requirements for a PSR review, not the supplier. However, an employer could request exemption documents from the supplier and if they are not available, this may be a factor in the employer's decision to purchase the equipment.

Furthermore, a supplier who is supplying equipment under a rental leasing or similar arrangement is required to ensure the equipment complies with the OHSA, and the regulations (OHSA section 31). This may require having a PSR.

If I am buying equipment from a supplier outside of Ontario, what should I do?

Regardless of where the equipment is manufactured, it would be advisable for the employer to make certain that their supply chain or procurement process very clearly states on the purchase order that a PSR is a requirement.

Another option would be for the employer to request documentation to support an exemption, if available. This documentation would be to confirm that the equipment was designed and built to a current applicable standard.

If an engineer has done a PSR and there is still an obvious hazard for an item not mentioned in the section 7 table, does the machine meet Regulation 851?

No. The PSR only deals with those eight items listed in the section 7 table and the applicable provisions of the Industrial Establishments Regulation (Regulation 851).

However, there may be other hazards, such as noise and inadequate lighting, that the employer must consider at any time to protect the health and safety of workers, including taking every precaution reasonable in the circumstances to protect workers.

If the PSR is done before the equipment apparatus/structure/ventilation system is installed, does the person conducting the PSR have to inspect to ensure the equipment/apparatus/structure/ventilation system is compliant and is safe for operation?

No. It is up to the employer to ensure compliance with the requirements of the regulation and ensure any non-compliant items identified in the PSR are addressed.

Ultimately, the accountability rests with the employer who has control of the workplace.

Do gas-fired appliances (boilers, furnaces, etc.) require a PSR?

A PSR must be carried out for appliances that are part of a process that involves the risk of ignition or explosion.

Appliances that are not part of a process that involves the risk of ignition or explosion and are designed and installed in compliance with the applicable legislation and standards (i.e. O. Reg. 220/01 [Boiler and Pressure Vessels](#) and, O. Reg. 211/01 [Propane Handling and Storage](#), under the Technical Standards and Safety Act, 2000) and are approved by the regulatory authority with jurisdiction (i.e. the Technical Standards and Safety Authority [TSSA]) do not require a PSR.

Do ovens require a PSR?

A PSR is not required if certain conditions are met. An oven used in a process that does not involve the risk of ignition or explosion, and that does not produce a substance that may result in the exposure of a worker in excess of any occupational exposure limits (for example, as set out in Regulation 833, [Control of Exposure to Biological or Chemical Agents](#); or O. Reg. 490/09, [Designated Substances](#)) may not be subject to PSR requirements. However, other OHS requirements apply to ovens and the device must be designed and installed in compliance with the applicable legislation and standards (e.g. O. Reg. 220/01 Boiler and Pressure Vessels, O. Reg. 211/01 Propane Handling and Storage, etc.) and is approved by the regulatory authority with jurisdiction (e.g. the Technical Standards and Safety Authority [TSSA], the Electrical Standards Authority [ESA], etc.). The employer should keep all relevant documentation should an inspector request to see it.

Is a PSR required in a water treatment plant (drinking water) or a wastewater treatment plant (sewage)?

Yes. Generally, the Regulation for Industrial Establishments (Regulation 851) applies to all industrial establishments (section 3), and PSR requirements apply to all factories other than logging operations. Water treatment plants fall within the statutory definition of factory in the OHSA.

Wastewater treatment plants, however, must be assessed on a case-by-case basis to determine if the facility falls within the definition of "factory" in the OHSA.

In addition to PSR requirements, employers are required by OHSA to take every reasonable precaution in the circumstances for the protection of a worker [see clause 25 (2)(h)].

[Previous](#) | [Next](#)

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Circumstances Described in the Section 7 Table

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- [Guarding](#)
- [Rack and stacking structures](#)
- [Spray booths](#)
- [Lifting devices](#)
- [Flammable liquids](#)
- [Dust collector for easily ignitable dust](#)
- [Molten metal in a foundry](#)
- [Chemical processes](#)

Guarding – subsections 7(5) and 7(6)

When is a pre-start health and safety review required?

A pre-start health and safety review (PSR) is required when any one of the following is used as a protective element in connection with an apparatus (item 2 in the section 7 table):

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.

A PSR is not required (as outlined in subsection 7(5)) 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 7(6) are met (see below); or
- (b) the protective element was not installed at the time the apparatus was manufactured and the conditions set out below are met: (subsection 7(6)).

As per subsection 7(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.

If no PSR is required because subsection 7(5) applies, the documents establishing the exemption must be readily accessible in the workplace for as long as the protective element remains in the workplace for the exemption to be valid.

Guarding provisions and standards

The provisions and circumstances listed under item 2 in the section 7 table of the [Industrial Establishments Regulation](#) act as a trigger to determine when a PSR is required for guarding. Sections 24, 25, 26, 28, 31 and 32 are the provisions of the Industrial Establishments Regulation that deal with guarding.

There are a number of standards that can be used to claim an exemption from a PSR or to support compliance; they are discussed below.

"A," "B" and "C" standards may be used for exemption or to support compliance. This means that if the equipment has been manufactured to meet one of these standards an exemption from doing a PSR may be claimed or, if the equipment was not manufactured to one of these standards, they may be used by the engineer doing the PSR to demonstrate that the equipment is in compliance with the applicable sections of the guarding sections of the Industrial Establishments Regulation (sections 24, 25, 26, 28, 31 and 32).

"A" and "B" standards are generic safety standards that give basic concepts and principles for design and general aspects, or deal with one safety aspect or one type of safety-related device that can be applied to machinery/processes. Type A Standards define fundamental concepts and general design principles that apply to all types of machinery, and Type B Standards are concerned with a particular aspect of safety and apply to most machinery. "C" standards give minimum safety instruction for a specific group of machinery.

Listings of "A," "B" and "C" standards are shown below. Standards flagged with an asterisk (*) have been reviewed by Ministry of Labour engineers and are accepted by the Ministry of Labour as good engineering practice needed to comply with section 7 of the Industrial Establishments Regulation. Standards not flagged with an asterisk have not been reviewed by the ministry. Such standards must be reviewed by a P. Eng. (professional engineer) to ensure that adherence to them would satisfy all the requirements of the regulation that are listed in the PSR table.

Please note that the use of generic machine guarding standards (type A and B) requires that a risk assessment be conducted as part of the exemption from conducting a PSR.

"A" and "B" standards:

- CSA-Z432*
- ANSI B11.19*
- ISO 4413*; ISO 4414*
- ISO 12100 Parts 1 and 2*
- ISO 13851*; ISO 13852*; ISO 13853*; ISO 13854*; ISO 13855
- ISO 13856*; ISO 14119*; ISO 14120*; ISO 14121*
- IEC 61496 Parts 1 and 2*

"C" standards:

- CSA Z142*; CSA Z434*; CSA Z615*;
- ANSI B11.01*; ANSI B11.02*; ANSI B11.03*; ANSI B11.06*; ANSI B11.08*;
- ANSI B11.10 ; ANSI B11.20*; ANSI B11.21*;
- ANSI B65.1* ; ANSI B65.2*; ANSI B65.5*; ANSI 15.06; ANSI/SPI B151.1*;
- ANSI Z245.1* and the [MOL Mobile Compacting Equipment Safety Guidelines](#).

There is a listing of codes, standards, manuals and handbooks in [Appendix I](#) that may be used by an engineer doing a PSR to determine compliance or measures to be taken to achieve compliance.

Related sections of the Industrial Establishments Regulation that may affect design criteria include: section 40 (electrical equipment, insulating materials and conductors), section 75 (blocking of equipment to prevent movement) and section 76 (lockout of equipment).

What documents are acceptable to establish an exemption?

The following documents are acceptable to establish such an exemption:

1. A notice in writing from the manufacturer declaring that the apparatus and protective element have been manufactured or modified to meet current applicable standards. Procurement/purchasing documentation verifying that the apparatus and protective element have been manufactured or modified to meet current applicable standards may be acceptable.

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 standards, if any; and

2. If the protective element was not installed when the apparatus was manufactured, a notice in writing from the installer stating that the protective element was installed in accordance with the manufacturer's instructions and current applicable standards, if any;

or

Certification from an accredited organization verifying that the apparatus and protective element have been manufactured or modified to meet current applicable standards may be acceptable, where such organizations are available.

For the purpose of section 7, a manufacturer is:

1. the original equipment manufacturer; and/or
2. an employer (systems integrator) who is responsible for integrating equipment/a group of machines or safety devices that have been procured to comply with current applicable standards, and/or items manufactured in house to those standards. Such equipment integration shall be subject to a documented risk assessment review if required by the applicable standard.

If no pre-start health and safety review is required due to the guarding provisions exemption, the owner, lessee or employer must keep documentation supporting the exemption readily accessible in the workplace [subsection 7(10)].

Do I need a PSR if I am replacing a light curtain with a fixed barrier guard or pullback device?

A PSR is not required for fixed barrier guards, holdback devices or pullback devices. However, the employer is reminded of their responsibility to ensure that all requirements of the Occupational Health and Safety Act (OHSA) and Regulations are complied with.

Even if a PSR is not required, or an exemption to the requirements of section 7 applies, the employer must ensure that workers are protected before operating any apparatus, structure, protective element or process in the workplace.

Do I need a PSR if I am replacing a light curtain with another light curtain (replacing an apparatus, structure, protective element or process with an identical one)?

A PSR would not be required if the light curtain is identical to the one being replaced. This would be considered maintenance. If the light curtain is not identical, a PSR would be required.

If a light curtain is being replaced with a two-hand control, is a PSR required?

Yes. This is considered a new installation, and the two-hand control is included in the circumstances described in the section 7 table; however, this may be subject to an exemption.

If a light curtain approved by the Canadian Standards Association (CSA) is being installed on a brake press, is a PSR required?

At present, the CSA does not certify equipment to be in accordance with a standard other than the Ontario Electrical Safety Code, O. Reg. 164/99. A PSR must, therefore, be performed.

The PSR will consider the method of installation, or placement of the light curtain, something that the CSA electrical certification does not cover.

Is a PSR required if a set of interlocked gates is replaced with a fixed guard?

No, a PSR is not required.

If an existing protective element is being replaced with a new and improved safety device, is a PSR required?

If the protective element was not installed at the time that the apparatus was manufactured, but was installed in accordance with the manufacturer's instructions and to the current applicable standards, a PSR would not

be required.

The documentation required by subsection 7(10) that establishes the exemption must be readily accessible in the workplace. If an exemption cannot be applied, then a PSR would be required.

Does equipment/apparatus installed prior to the changes to section 7 (October 7, 2000) require a PSR?

The regulation came into effect on October 7, 2000, and if a review was done prior to this date, then another review is not necessary, unless modifications to the existing machine, equipment, device, structure, protective element or process have since been undertaken.

If a PSR makes reference to standards such as the CSA Code for Punch Press and Brake Press Operation, but the employer does not install monitoring devices such as the brake monitor referenced in the standard and the engineer's PSR report highlights this, would this be acceptable?

The only parts of a standard that would apply are the ones dealing with worker protection from the hazards addressed by the applicable sections listed in the table under section 7 of the Regulation for Industrial Establishments. A brake monitor referenced in either the standard or the PSR is not considered necessary for compliance with the applicable sections listed in the table.

Are emergency stops excluded from PSRs?

Since emergency stops are not addressed in section 7, they are excluded from PSR requirements. Emergency stops are not guards. A guard is a device that is designed to prevent an accident from taking place. While an emergency stop control is useful as a safety device to immediately bring a machine to a stop should an accident occur, it is not designed to prevent the accident from occurring in the first place. This is why section 27 of the Industrial Establishments Regulation is not referenced as one of the applicable sections in the section 7 table for item 2.

If a manufacturer builds machines for its own use, according to these guidelines, it becomes the "system integrator". In this case would the manufacturer have to comply with section 7?

Yes. As the "system integrator", the manufacturer would have the duty to build the machine in accordance with the standards that comply with section 7.

Would the firm, as a "system integrator", also have the right to issue its own internal exemption from having to hire a professional engineer (P. Eng.) to conduct a PSR?

There is still a requirement to have a professional engineer review the integrated equipment/machines/safety devices to determine that they comply with the requirements of section 7. While individual equipment might be exempt if it meets the prescribed criteria (e.g. a statement from the manufacturer that the machine was built in accordance with current applicable standards), a professional engineer would then be required to issue either a letter stating that the integrated equipment meets the exemption requirements or a PSR report.

Is it always necessary to comply with a specific standard or use industry practice?

It is always necessary to comply with the requirements of the OHS and its regulations. Using other standards or industry practices is generally considered to be good practice and also provides documentation that can be used to demonstrate due diligence in meeting the legislative or regulatory requirements.

[Return to top](#)

Rack and stacking structures - subsection 7(7)

When is a PSR required?

When materials, articles or things are to be placed or stored on a structure that is a rack or stacking structure (item 3 in the section 7 table) a pre-start health and safety review is required unless the rack or stacking structure is designed and tested for use in accordance with current applicable standards.

For the purpose of section 7, "rack and stacking structures" include:

- industrial pallet racks
- moveable shelf racks
- stacker racks
- drive-in and drive-through racks, and
- cantilever racks.

They are made of cold-formed, hot-rolled steel, wood, aluminum or concrete structural members.

Rack and stacking structures exemption

If no pre-start health and safety review is required because subsection 7(7) of the regulation applies, the owner, lessee or employer shall keep documents establishing the exemption readily accessible in the workplace for as long as the rack or stacking structure remains in the workplace.

If no pre-start health and safety review is required due to the rack and stacking structures exemption, the documentation supporting the exemption must be readily accessible in the workplace per subsection 7(10) of the regulation.

What documents are acceptable to establish an exemption?

A document from the manufacturer, supplier or vendor of the rack or stacking structure that indicates the requirements for its safe use, and containing a statement outlining the loading conditions and design standards used to design and build the rack or stacking structure. The requirements can take the form of, but are not limited to, capacity tables, capacity charts, structural drawings or a written statement specifying the capacity. The document must bear the seal and signature of a professional engineer; or

A notice in writing from the manufacturer declaring that the rack or stacking structure is designed and tested for use in accordance with current applicable standards.

A recommended practice would be to have a professional engineer sign off on the exemption.

Rack and stacking structure provisions and standards

The provisions and circumstances listed in the section 7 table of Industrial Establishments Regulation act as a trigger to determine when a PSR is required for racking and stacking structures. There is one standard that can be used for an exemption from a PSR or to support compliance with a PSR, and other standards and codes to determine compliance with the applicable racking and stacking structures section of Industrial Establishments Regulation. These standards and codes are discussed below.

An exemption from doing a PSR may be claimed if the rack or stacking structure has been manufactured to meet the following Racking Manufacturing Institute Standard: Specification for the Design Testing and Utilization of Industrial Steel Storage Racks, Part 1, 2, 3. This standard deals with detailed safety requirements for a particular piece of equipment such as racks and stacking structures.

If the rack or stacking structure was not manufactured to this standard, the standard may be used by the engineer doing the PSR to demonstrate that the rack or stacking structure is in compliance with the applicable clause of the Industrial Establishments Regulation [clause 45(b)].

The codes and standards listed below cannot be used for exemption purposes, but may be used by an engineer doing a PSR to determine compliance or measures to be taken to achieve compliance.

- Steel storage racking AS 4084-1993
- SEMA Code of Practice for the Design of Static Racking
- Pallet racks JIS Z 0620 - 1998

Is there an accredited organization that certifies racks?

No. However, if an exemption is invoked under subsection 7(7), the employer must request the documentation from the supplier or the manufacturer to substantiate that the rack is designed, manufactured, and installed in accordance with the listed specifications and instructions.

Does a shelf similar to a bookshelf for the purpose of storing small nuts and bolts require a PSR or exemption?

No. A PSR is not required for a portable rack as described above.

I am purchasing a 72-inch high and 18-inch deep hand-loaded metal shelving system for my maintenance shop that will be used for storing spare parts, do I need a PSR?

No. Section 7 is for intended for "rack and stacking structures" that are typified by tall structures containing loads that are placed onto the structure with lift trucks. Typical examples of these structures are; drive-in racks, cantilever racks, push-back racks, and selective racks.

Note that many other types of racks or stacking structures may be within the scope of section 7. The employer is responsible for determining if the design of the rack or stacking structure is within the scope of section 7.

If a firm purchases a drive-in rack and a cantilever rack system, will it be exempt from the PSR requirement if the manufacturer provides documentation stating that it is "designed and tested for use with the current applicable RMI standard?"

No, it would not be exempt because the RMI standard does not speak to these types of racks. In addition, the current applicable standard (Specification for the Design Testing and Utilization of Industrial Steel Storage Racks—ANSI MH16.1) specifically states that these types of racks are outside of its scope.

An employer may still be able to get an exemption from carrying out a PSR if the manufacturer of the racking system provides specific documentation that bears the seal of a professional engineer stating that the racking system has been designed and built to the current applicable standards.

If rack components (e.g. beams and upright frames) are "designed and tested for use with current applicable standards," does a rack structure assembled using the components require a PSR?

Yes, a PSR would be required. However, an exemption may apply if documentation exists and can be provided that clearly states the structure is "designed and tested for use with current applicable standards."

The documentation for the structure must identify the members (components) contained within it and the engineering controls or measures required for their assembly into the rack structure.

The documentation must also include:

- a) a statement from the manufacturer stating the structure is "designed and tested for use in accordance with the Specification for the Design Testing and Utilization of Industrial Steel Storage Racks—ANSI MH16.1," or
- b) an indication of the design standards used, the maximum loading conditions, the requirements for its safe use (i.e. anchorage, erection tolerances, etc.), and a seal of a professional engineer licensed in Ontario.

How does one establish a link between racks within a warehouse facility and the documentation (that establishes their subsection 7(7) exemption) that is on file?

Generally speaking, racks do not have markings that identify their manufacturer, and racks from several manufacturers may appear very similar but have different capacities. Nevertheless, these rack structures are required to:

- a) be in compliance with the regulation and
- b) have the required documentation that establishes compliance.

Users are required to use practices that can achieve these requirements or they will not be able to demonstrate compliance with the regulation. Being non-compliant results in the need for an engineering report that can verify compliance.

If a damaged component is replaced or repaired, is a PSR required?

A PSR is required when an employer installs a new racking system or modifies an existing racking system. A damaged rack may require a PSR if the racking system is significantly altered or its use changed. If the damage is repaired in-house, a professional engineer licensed in Ontario will need to provide written guidance for the repairs.

However, a PSR is not required if replacing or repairing a component does not modify the rack or stacking structure, provided the replacement/repaired component has the required capacity and it is designed and

tested for use in accordance with the current applicable standard, or documentation from the manufacturer of the repaired component establishes the repair has sufficiently restored the capacity of the component.

If a rack structure is assembled using components from different manufacturers or suppliers, and the individual components have documentation indicating they are "designed and tested for use with current applicable standards", is the rack structure exempt?

Although the different manufacturers' components have been "designed and tested for use with current applicable standards," the fact that these components have been mismatched (i.e. components from one manufacturer plus components from another manufacturer) means that a PSR may be required.

If this assembly is considered a modification, the employer would be advised to conduct an evaluation to determine if a PSR is required.

Note that an evaluation is not a PSR but merely a way of determining whether a PSR is required.

When modification of a rack structure triggers a PSR, what is the PSR to examine (e.g. affected components, bay, row, facility)?

The process of determining whether a PSR is required also includes a determination of what is required to bring the rack structure back into compliance with the regulation. Once this is determined, the scope of a PSR can then be limited to addressing the modification that resulted in noncompliance.

Is a field review of the installation required to confirm the racks are installed in accordance with the current applicable standards?

Although a field review by the supplier is not mandatory, the rack structure is still required to be installed in accordance with the requirements.

The installation of a racking system should only be carried out by workers who have received adequate training and are familiar with rack assembly procedures. The installation must be in accordance with the manufacturer's instruction or under the instruction of a professional engineer licensed in Ontario.

Does a PSR need to review the a) loads (pallets) for suitability to interfacing with the racks and b) the stability of the loads stored on the pallets?

No, provided the PSR or documentation used to provide a subsection 7(7) exemption specifies the parameters and/or type of load the rack structure is designed to support. It is the responsibility of the employer to ensure the loads are stable and conform to the specified parameters.

Does the structural adequacy of the floor that supports the rack structure need to be reviewed by the PSR?

No, but it must be designed to safely support the racks as stipulated by other sections of the OHSA and its regulations. The scope of a PSR can be limited to item 3 in the table of section 7, which is specific to racks and stacking structures with material, articles, or things placed on them.

Are rack storage systems with elevated floors (pick modules) subject to PSR, and does the review need to include items such as fall arrest?

The employer must review the other regulations under the OHSA that apply such as fall protection, and take the necessary measures required to comply. In this case it should be noted the vendor or supplier of the rack storage system is still required to comply with other regulations such as building codes that deal with issues such as guarding of open edges.

Are rack storage systems with elevated floors (pick modules) subject to PSR, and does the review need to include items such as fall arrest?

The employer must review the other regulations under the OHSA that apply such as fall protection, and take the necessary measures required to comply. In this case it should be noted the vendor or supplier of the rack storage system is still required to comply with other regulations such as building codes that deal with issues such as guarding of open edges.

When doing the PSR, should the review document all damage that may adversely affect the capacity of the racking structure?

The requirements of a PSR are outlined in subsection 7(4). The review does not require components be inspected for damage and the effects of the damage assessed; however, the OHSA still requires the employer maintain the racks in good and safe condition.

If the contents stored within the racking units change, is a PSR required?

The purpose of clause 45(b) of the Industrial Establishments Regulation is structural. It is required that contents be stored so that they will not tip, collapse or fall.

If the new contents include those items listed in item 1 of the section 7 table (flammable liquids), then a PSR may be required.

If the load limits as stated by the manufacturer of the rack are exceeded, then a PSR will be required.

[Return to top](#)

Spray booths - subsection 7(8)

When is a PSR required?

A PSR is required if a process involves the risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety.

Per subsection 7(8) of the regulation, a PSR is not required if the process is conducted inside a spray booth that is manufactured and installed in accordance with current applicable standards and the spray booth meets the definition of a spray booth in O. Reg. 213/07 made under the [Fire Protection and Prevention Act, 1997](#):

"spray booth" means a power-ventilated structure that encloses or accommodates a spraying operation so that spray vapour and residue can be controlled and exhausted.

If no pre-start health and safety review is required due to the spray booth exemption, the documentation supporting the exemption must be readily accessible in the workplace per subsection 7(10) of the regulation.

Spray booth provisions and standards

The provisions and circumstances listed in the section 7 table of [Industrial Establishments Regulation](#) act as a trigger to determine when a PSR is required for a process that involves a risk of ignition or explosion, such as a spray booth.

Section 63 is the applicable provisions of the Industrial Establishments Regulation that deal with a process that involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety.

If the spray booth has been manufactured to meet NFPA – 33 Spray Booth, an exemption from doing a PSR may be claimed. If the spray booth was not manufactured to this standard, it may be used by the engineer doing the PSR to demonstrate that the spray booth is in compliance with the applicable section of the Industrial Establishments Regulation (section 63).

The standards listed below cannot be used for exemption purposes but may be used by an engineer doing a PSR to determine compliance or measures to be taken to achieve compliance.

- NFC Parts 4 and 5;
- NFPA-30; NFPA-34; NFPA-68 and 69; NFPA-86; NFPA-497; NFPA-499;
- NFPA-505; NFPA-820; ANSI/API 500; ANSI ASHRAE 15
- Factory Mutual Systems Industrial Loss Prevention/Industrial Ventilation Manual (ACGIH)
- CSA-B149.1-05 Natural gas and propane installation code
- CSA B52-13 Mechanical Refrigeration Code
- CSA B51-14 - Boiler, Pressure Vessel, and Pressure Piping Code

The other Ontario legislation listed below may need to be considered to meet compliance with other sections of Industrial Establishments Regulation (i.e. not section 7 - PSRs)

- Fire Prevention and Protection Act, 1997 and the Ontario Fire Code (O. Reg. 213/07)

- Ontario Building Code (O. Reg. 332/12) under the Building Code Act, 1992
- Ontario Electrical Safety Code (O. Reg. 164/99) under the Electricity Act, 1998
- Technical Standards and Safety Act, 2000

Other related sections of the Industrial Establishments Regulation that may affect design criteria include: section 121 (definition of hazardous room) and section 122 (requirements for a hazardous room).

What about the equipment that is installed inside the spray booth?

It should be noted that the spray booth exemption does not apply to equipment installed inside the spray booth (e.g. robots). A PSR may be required for such equipment, e.g. if the circumstances described in section 7 apply. For example, if a robot with a guarding mechanism were installed in a spray booth item 2 of the section 7 table would apply and a PSR would be required.

If no PSR is required due to the above exemption, the owner, lessee or employer must keep documentation supporting the exemption readily accessible [subsection 7(10)].

What documentation do I need to establish the exemption?

The following documents are acceptable in establishing such an exemption:

1. A notice in writing from the manufacturer, or certification from an accredited organization, declaring that the spray booth is manufactured to current applicable standards, and
2. A notice in writing from the installer stating that the spray booth is installed in accordance with the manufacturer's instructions and current applicable standards.

In the section 7 table, item 4, under "Circumstances" it states, "A process involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety", then in the text of the regulation [subsection 7(8)] it refers to "spray booth". Does this mean that the regulation applies to spraying operations?

Yes, however it is not limited to spraying operations. It includes all processes that involve a risk of ignition or explosion creating a condition of imminent hazard to a person's health or safety.

What is a flammable gas?

For the purpose of this section, "flammable gas" is a flammable gas as defined in Part 7, Subpart 2 (Flammable Gases) of the Hazardous Products Regulations made under the federal Hazardous Products Act as follows:

A "flammable gas" means a gas that has a flammable range when mixed with air at 20 degrees C and at the standard pressure of 101.3 kPa.

The Hazard Products Regulations classifies flammable gases into one of two categories:

Flammable Gases – Category 1

A gas that

- a) is ignitable when mixed with air at a concentration less than or equal to 13.0% by volume; or
- b) has a flammable range when mixed with air equal to or greater than 12 percentage points, regardless of the lower flammable limit.

Flammable Gases – Category 2

A gas that is not classified in the "Flammable Gases – Category 1" and has a flammable range when mixed with air.

Do we need a PSR for the installation of a self-contained powder coating system?

Yes, if the employer can't demonstrate that the system was manufactured and installed in accordance with current applicable standards (NFPA 33 and Ontario Fire Code [OFC]).

Additional standards may be used providing that they have been reviewed by a P. Eng. to ensure that adherence to them would satisfy all the requirements of the regulation that are listed in the PSR table.

If piping, vessels, electrical and instrumentation are added to an existing process, would this be considered new or a modification to an existing process?

It may be, depending on the extent of the modifications. The process can be slightly modified by these changes or they may result in an entirely new process.

The change must be evaluated by the employer to determine if the process has been modified or changed.

Do process piping modifications involving hydrocarbons at pressures and temperatures greater than 103.4 kPa (15 psi) and 48.9°C (120°F) require a PSR (since in the event of a failure of a piping system, a condition of imminent hazard to a person's health would occur)?

A PSR would be required only if the process itself is being modified. It is the risk created by the process itself that is being reviewed during a PSR, not the risk resulting from equipment/piping failures. Equipment and piping systems handling hazardous materials must be designed to meet the appropriate standards and codes.

[Return to top](#)

Lifting devices - subsection 7(9)

When is a PSR required?

A PSR is required when the construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist.

Are there any exemptions?

A PSR would not be 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.

If no PSR is required due to the above exemption, the owner, lessee or employer must keep documentation supporting the exemption readily accessible in the workplace [subsection 7(10)].

The following documents are acceptable in establishing such an exemption:

1. Design drawings or a report containing the design loading capacity of the original support structure for the lifting device or travelling crane. The design drawings or report must bear the signature and seal of a professional engineer,
- or
2. Certification from an accredited organization declaring that the automobile hoist meets current applicable standards.

Lifting devices provisions and standards

The provisions and circumstances listed in the Section 7 Table of Industrial Establishments Regulation act as a trigger to determine when a PSR is required for a lifting device. Sections 51 and 53 are the applicable provisions of the Industrial Establishments Regulation that deal with lifting devices.

A PSR would not be required for an automobile hoist if it is certified that it meets ANSI – ALI ALCTV – 2011, Exemption, third party certification for automobile hoists. If the auto hoist was not manufactured to this standard, it may be used by the engineer doing the PSR to demonstrate that the auto hoist is in compliance with the applicable section of Industrial Establishments Regulation (section 51).

Related sections of Industrial Establishments Regulation that may affect design criteria include: section 52 (requirements for a lifting device used to support, raise or lower a worker) and section 54 (requirements for mobile equipment).

Does item 7 of the section 7 table refer to a forklift truck?

No.

Are the forks on a forklift related to the lifting device or are they considered part of the lifting device?

The forks of a forklift are considered to be part of the lifting device. In accordance with the Industrial Establishments Regulation, a 'lifting device' means a device that is used to raise or lower any material or object and includes its rails and other supports but does not include a device to which O. Reg. 20/01 (Elevating Devices), under the Technical Standards and Safety Act, 2000 applies.

In item 7 of the section 7 table, does the lifting device refer to lifting components below the hook?

Below the hook components are considered part of the lifting device.

Are monorails and jib cranes included in the category of lifting devices?

Yes.

When jib cranes (free standing or column mounted) are purchased from a manufacturer and installed by the owner, does this invoke a PSR?

Yes.

Does the purchase of a new monorail beam alone invoke a requirement for a PSR?

Yes, a PSR is required. However, if the supporting structure was originally designed for it and its capacity does not exceed the capacity provided for in that original design, a PSR would not be required [subsection 7(9)].

Does the purchase or in-house design and construction of a new piece of lifting equipment, such as a mechanical tong or motorized coil grab or something simple, such as a new wire rope sling, require a PSR?

If the capacity of the mechanical tong or motorized coil grab or new wire rope sling does not exceed the capacity of the supporting structure that was originally designed for this lifting device, a PSR is not required [section 7(9) applies]. However, the requirements of section 51 of the Industrial Establishments Regulation for certification by a competent person before first use would still apply.

The lifting device must be plainly marked with sufficient information so as to enable the operator of the device to determine the maximum rated load that the device is capable of lifting under any operating condition [clause 51(1)(c)].

Flammable liquids

When is a PSR required?

A PSR is required when flammable liquids are located or dispensed in a building, room or area.

Flammable liquids provisions and standards

Subsections 22 (1), (2) and (4) are the applicable provisions of the Industrial Establishments Regulation that deal with flammable liquids.

There are no "A," "B" or "C" standards that may be used for an exemption. However, there are standards and codes that are useful references; they are discussed below.

The following standards may be used by an engineer doing a PSR to determine compliance or measures to be taken to achieve compliance: NFC Part 4; NFPA-30; NFPA-68 and 69; NFPA-505; Factory Mutual Systems Industrial Loss Prevention.

The Ontario legislation listed below may need to be considered to meet compliance with other sections of Industrial Establishments Regulation (i.e. not specifically section 7 PSRs): Ontario Fire Code (OFC) Part 4; Technical Safety Standards Act, 2000; Ontario Electrical Safety Code (O. Reg. 164/99) under the Electricity Act, 1998.

Related sections of the Industrial Establishments Regulation that may affect design criteria include: section 121 (definition of hazardous room), section 122 (requirements for a hazardous room) and section 61 (requirements for refuelling gasoline engines on mobile or portable equipment).

[Return to top](#)

Dust collector for easily ignitable dust

When is a PSR required?

A PSR would be required when 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.

Dust collector provisions and standards

Section 65 is the applicable provisions of the Industrial Establishments Regulation that deals with dust collectors.

There are a number of NFPA standards that relate to dust collectors that involve a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety. Some of these include:

- NFPA 652 Standard on the Fundamentals of Combustible Dust
- NFPA 654 Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 484 Standard For Combustible Metals
- NFPA 68 Standard on Explosion Protection by Deflagration Venting
- The Aluminum Association "Guidelines for Handling Aluminum Fines Generated During Various Aluminum Fabricating Operations" designated F-1

Section 64 (use of separators to prevent dust explosion) of the Industrial Establishments Regulation may affect design criteria.

[Return to top](#)

Molten metal in a foundry

Provisions and standards

A PSR would be required when a factory produces aluminum or steel, or is a foundry that melts material or handles molten material.

Applicable provisions of the Industrial Establishments Regulation that set out health and safety precautions when producing aluminum or steel are: 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.

[Return to top](#)

Chemical processes

When is a PSR required?

A PSR is required when 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 R.R.O. 1990, Regulation 833, O. Reg. 490/09, and O. Reg. 278/05 under the OHS Act.

Sections 127 and 128 are the applicable provisions of the Industrial Establishments Regulation that deal with chemical processes.

There are no standards that can be used for an exemption from a PSR. However, Regulation 833 Control of Exposure to Biological or Chemical Agents or O. Reg. 490/09 Designated Substance Regulation may be used to support compliance.

The guides and references listed below may be used by an engineer doing a PSR to determine compliance or measures to be taken to achieve compliance:

- NFC Part 3
- Industrial Ventilation Manual, ACGIH
- MOL-EDS-4-05 Chlorine
- MOL-EDS-4-04 Ammonia

[Return to top](#)

[Previous](#) | [Next](#)

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Disclaimer: This web resource has been prepared to assist the workplace parties in understanding some of their obligations under the Occupational Health and Safety Act (OHSA) and the regulations. It is not intended to replace the OHSA or the regulations and reference should always be made to the official version of the legislation.

It is the responsibility of the workplace parties to ensure compliance with the legislation. This web resource does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.

While this web resource will also be available to Ministry of Labour inspectors, they will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This web resource does not affect their enforcement discretion in any way.

The Pre-Start Health and Safety Review Report

Issued: November 23, 2016

Content last reviewed: November 2016

What must the pre-start health and safety review report include?

When a pre-start health and safety review (PSR) is carried out, a written report is required that must contain the following:

1. Details of measures that must be taken to bring the apparatus, structure, protective element or process into compliance with the specified provisions of the Industrial Establishments Regulation listed in the section 7 table [clause 7(4)(a)].

Note: If the reviewer has used standards, specifications, calculations, risk analyses or other parameters other than the requirements of the Industrial Establishments Regulation, he or she must list the details of all those references or parameters, upon which the PSR is based, while still listing the details in item number 1, above.

2. Details of measures to protect the health and safety of workers that are to be taken before testing is carried out [clause 7(4)(b)] if testing is required before the apparatus or structure can be operated or used or before the process can be used.

Note: For the purposes of this section, “testing” may include debugging, commissioning and similar operations prior to production.

3. Details of the structural adequacy of the apparatus or structure if item 3 or item 7 of the section 7 table applies [clause 7 (4)(c)].
4. The signature of the person performing the pre-start health and safety review [subsection 7 (13)] and the date it was performed.
5. If a professional engineer performed the PSR, his or her seal [subsection 7 (13)].
6. If the person performing the PSR is not a professional engineer, details of his or her special, expert, or professional knowledge or qualifications [subsection 7 (13)].

Is the PSR report required to examine all applicable regulations under the Occupational Health and Safety Act, or just the particular sections specified in the section 7 table?

Refer to the “applicable provisions” column in the section 7 table. The sections stated in that column are those that must be examined; however, there are also related sections in the Industrial Establishments Regulation and other legislation/regulations that are beyond the requirements of section 7.

Is it necessary to renew or update a PSR after a period of time if no changes have been made?

No, the passage of time is not a trigger for a renewal since Section 7 does not have requirements to update or renew a PSR.

Does the engineer carrying out the PSR need to complete a design review or an “as-installed” review?

A PSR is intended to be a design review prior to installation, not an as-installed review.

Engineers completing a PSR are not required to examine the as-installed equipment, although they may do so if adequate design drawings do not exist or if they wish to ensure the installation is done according to the design.

The PSR is undertaken before equipment is operated and ideally at the design stage. The employer must take any measures necessary to bring the construction, addition, installation or modification into compliance before the equipment is operated.

A best practice which most engineers follow is to examine the as-installed equipment to ensure they have not overlooked or missed any critical details and to ensure their instructions were properly understood and followed. A “sign-off” that the equipment is installed in conformance with the design is recommended.

Where do I keep or locate the pre-start health and safety review report?

The PSR report and supporting documentation should be kept readily accessible in the workplace for which the PSR was conducted for as long as the apparatus, structure, protective element or process remains in the workplace.

Subsection 7(14) requires that the report:

1. be kept readily accessible in the workplace together with any supporting documents,
- and
2. be provided to the Joint Health and Safety Committee or Health and Safety Representative, if any, before the apparatus, structure, protective element or process is operated or used.

If the paper copy of the report were located at a head office in another city or country, and could not be sent by electronic means, there might not be compliance with this provision, since the report would not be readily accessible. However, if the report were available electronically at the workplace where the machine, equipment, device or process is located, this would likely constitute compliance. The signature of the person who carried out the review must be on the report, as well as the seal of the professional engineer, if applicable.

What do I do with the documentation establishing an exemption?

Subsection 7(15) requires the documents to be made available for review, upon request, to the Joint Health and Safety Committee or Health and Safety Representative, if any, or to a Ministry of Labour inspector. Also, subsection 7(10) requires that the documents establishing the exemption be kept 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.

Must an owner, lessee or employer address all the measures identified in the PSR?

Clause 7 (3)(a) requires that all the measures identified in the PSR for compliance with the sections of the regulation identified in the section 7 table must be taken before the apparatus, structure, protective element or process is used or operated.

Alternatively, if some or all of the measures identified in the PSR are not taken, the owner, lessee or employer must provide written notice to the Joint Health and Safety Committee or the Health and Safety Representative, if any. This notice must indicate what measures have been taken to comply with the relevant provisions of the Regulation that are listed in the section 7 table [clause 7(3)(b)].

In any case, appropriate measures must be taken to ensure the safety of workers.

[Previous](#) | [Next](#)

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The Reviewer Carrying Out a Pre-Start Health and Safety Review

Issued: November 23, 2016

Content last reviewed: November 2016

Who may perform a pre-start health and safety review?

A pre-start health and safety review (PSR) required under items 1, 2, 3, 4, 5, 6, or 7 of the section 7 table must be conducted by a professional engineer.

In other words, in the following circumstances the PSR must be conducted by a professional engineer:

1. Flammable liquids are located or dispensed in a building, room or area.
2. Any of the following are used as protective elements in connection with an apparatus:
 - o 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.
 - o Barrier guards that use interlocking mechanical or electrical safeguarding devices.
3. Material, articles or things are placed or stored on a structure that is a rack or stacking structure.
4. A process involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety.
5. 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. A factory produces aluminum or steel or is a foundry that melts material or handles molten material.
7. The construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist.

A PSR required under item 8 of the section 7 table must be conducted by a professional engineer or by a person who possesses special, expert or professional knowledge or qualifications appropriate to assess any potential or actual hazards [section 7(12)]. This person may have a specific qualification, such as being a Certified Industrial Hygienist (CIH) or Registered Occupational Hygienist (ROH), when the following circumstances exist:

- A process uses or produces a substance that may result in the exposure of a worker in excess of any exposure limit set out in Regulation 833 of the Revised Regulations of Ontario, 1990 (Control of Exposure to Biological or Chemical Agents), O. Reg. 278/05 (Designated Substance — Asbestos on Construction Projects and in Buildings and Repair Operations) or O. Reg. 490/09 (Designated Substances) all made under the Act.

Can the PSR involve more than one person?

If a team of reviewers carries out the PSR, more than one discipline may be required. The names and disciplines of the people involved should be included in the report.

Who would do the review of a process that may be both explosive and toxic?

In the case of a process with explosion and toxicity hazards, there likely would be more than one person conducting the PSR.

One of these people would have to be a professional engineer. A best practice may be to include a chemical engineer as part of the review team.

Can a professional engineer from another jurisdiction conduct the PSR?

A professional engineer, or P. Eng., is defined in the Industrial Establishments Regulation as "a member or licensee of the Association of Professional Engineers of Ontario (PEO) under the [Professional Engineers Act](#)." Therefore, an engineer from another jurisdiction can only conduct the PSR if they are granted a licence, limited licence or temporary licence by the PEO to practice in Ontario. They must follow the Code of Conduct as set out in the Professional Engineers Act and its regulations.

Where can I get a list of engineering consultants who can perform a PSR?

You may wish to contact your [safe workplace association](#), depending upon your sector, to enquire if they can perform a PSR or provide you with referrals.

You may also want to contact the [Consulting Engineers of Ontario](#) (CEO) for a list of consulting firms.

You may also contact the [Professional Engineers of Ontario](#) which has a publication called "Engineering Dimensions" with advertisements from various engineering firms.

May a company engineer do a PSR?

Yes, a company engineer may carry out a review provided he/she is a professional engineer licensed by the PEO, and must follow the Code of Conduct as stated in the Professional Engineers Act and its regulations.

Who can sign the pre-start health and safety review report?

If a professional engineer conducts the review, she or he must sign, seal and date the report [subsection 7(13)]. If a team of engineers is involved in the review, then either the lead engineer or each member of the team must sign, seal and date the report.

If a person other than a professional engineer produces the report, she or he must sign and date the report, and the report must include details of his or her special, expert or professional knowledge or qualifications [subsection 7(13)]. If a team is involved in the review, either the team leader or each member of the team must sign and date the report.

[Previous](#) | [Next](#)

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Joint Health and Safety Committees and Health and Safety Representatives

Issued: November 23, 2016

Content last reviewed: November 2016

What is the role of the Joint Health and Safety Committee or the Health and Safety Representative?

The Joint Health and Safety Committee (JHSC) or the Health and Safety Representative (HSR) must be provided with the following:

1. The report of the pre-start health and safety review (PSR) before the apparatus, structure, protective element is operated or used, or before the process is used [subsection 7(14)].
2. Upon request, documents establishing an exemption to the requirement to conduct a PSR [subsection 7(15)].
3. If some or all of the measures required by the PSR are not taken, written notice of the measures that will be taken to comply with the applicable provision(s) of the Industrial Establishments Regulation [clause 7(3)(b)].

Subject to subsection 7(3), the apparatus, structure, or protective element may be operated or the process used once the PSR report, if required, is provided to the JHSC or HSR.

What is the purpose of giving the PSR to the JHSC or HSR?

As part of the internal responsibility system, health and safety issues can and should be discussed with the JHSC or HSR, and recommendations regarding how an employer can improve workplace health and safety should also be made to the JHSC or HSR, if any.

Providing the PSR report to the JHSC or HSR reinforces the employer's duty to inform his or her workers about workplace hazards, and reinforces the powers of the JHSC or HSR to be made aware of health and safety tests and reports that may affect workers.

Can the JHSC/HSR request additional machine guarding after an engineer who has completed the PSR feels that it is adequately guarded?

Consistent with their powers under the Occupational Health and Safety Act (OHSA), the JHSC or HSR representative can make recommendations to the employer on matters of health and safety. This could include machine guarding. The employer must respond in writing within 21 days of receiving the recommendations. The Ministry of Labour may also be notified by the JHSC or individual members, should they feel that there is an existing safety problem.

Does a PSR circumvent the need for JHSC or HSR audits?

No. The PSR is a requirement under section 7 of the Industrial Establishments Regulation that applies only to factories, except logging operations.

The requirement for inspections by the JHSC or HSR is under the OHSA and applies to any workplace required by the Act to have a JHSC or a HSR.

[Previous](#) | [Next](#)

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Applicable Regulations, Codes and Standards

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For the purpose of these guidelines, the term “standards” includes standards, codes and other legislation.

The [Industrial Establishments Regulation](#) is, to a large measure, a performance-based standard. This means that the regulation defines what level of protection is to be provided and the objective to be achieved, but does not state how to achieve the required level of protection.

The [provisions and circumstances of section 7](#) of the regulation listed in the section 7 table act as triggers to determine whether a pre-start health and safety review (PSR) is required.

To comply with the requirements of section 7, it is necessary to refer to other recognized applicable detailed codes and standards, such as the Ontario Fire Code, National Fire Code, NFPA codes and standards, CSA codes and standards, ANSI standards, etc.

Appendix I provides a partial list of current applicable standards that the reviewer may use in completing a PSR. Standards that are flagged with an asterisk have been reviewed by Ministry of Labour engineers and are accepted by the Ministry of Labour as good engineering practice needed to comply with section 7 of the Industrial Establishments Regulation, and are considered “current applicable standards” for exemption from the PSR requirements.

In relying on a standard for exemption, the reviewer must consider the applicable sections of the current applicable standards. The same principle may apply when using a standard to support compliance.

Standards not flagged with an asterisk, or that are not listed in these guidelines require additional review or assessment to ensure compliance adherence to them would satisfy all the requirements of the regulation that are listed in the section 7 table before they can be used for exemption from the PSR requirements (see [Appendix I: Recognized Standards](#) for acronyms and full names of standards, including codes).

Some examples of standards legislated in Ontario are shown in (1) below, and some of the standards shown in (2) are listed in Appendix I as meeting the intent for compliance with other sections of the section 7 regulation that are not specific to the PSR process.

1. Examples of Ontario prescribed standards:
 - o [Ontario Fire Code, O. Reg. 213/07](#)
 - o [Ontario Electrical Safety Code, O. Reg. 164/99](#)
 - o [Technical Standards and Safety Act, 2000](#)
 - o [Ontario Building Code, O. Reg. 332/12](#)
 - o [Propane Storage and Handling Regulation, O. Reg. 211/01](#)
2. Examples of Canadian, North American, European and world standards:
 - o National Fire Code
 - o National Building Code
 - o CSA—International standards
 - o National Fire Protection Association (NFPA) standards
 - o American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
 - o American National Standards Institute (ANSI) standards
 - o American Petroleum Institute (API) standards
 - o International Standards Organisation (ISO) standards
 - o International Electrotechnical Commission (IEC) standards
 - o European Norm (EN) standards

What if “current applicable standards” change in five years—would another pre-start health and safety review be required?

No. A PSR is required only when a new apparatus, structure, protective element or a new process is constructed, added or installed, or when the apparatus, structure, protective element or process is modified.

If an applicable standard is amended or changed, a PSR would not be required so long as the apparatus, structure, protective element or process were not newly installed or modified.

[Previous](#) | [Next](#)

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Appendix I: Recognized Standards

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The following partial list of standards, including 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 familiarizing 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 these guidelines were published has been used.

Those performing pre-start reviews (PSRs) are advised to contact the appropriate ministry, agency or administrative authority to ensure that they are using the latest versions of these documents.

A. Occupational Health and Safety Act and Regulations

- [Occupational Health and Safety Act](#) and its [regulations](#).

B. Other legislation and regulations that may apply

- The [Building Code Act, 1992](#) and the [Ontario Building Code, O. Reg. 332/12](#) (as amended), which are administered by the Ministry of Municipal Affairs and Housing, Housing Development and Buildings Branch. The Ontario Building Code establishes minimum provisions for the safety of new or altered buildings regarding public health, fire protection and structural adequacy.
- The [Fire Protection and Prevention Act, 1997](#) and [Ontario Fire Code, O. Reg. 213/07](#) (as amended), which are administered by the Ministry of Community Safety and Correctional Services, and the Office of the Fire Marshal. The Ontario Fire Code establishes a standard for fire prevention, firefighting and fire safety in buildings that are in use. Part IV applies to flammable and combustible liquids and Part V to hazardous materials, processes and operations.
- The [Electricity Act, 1998](#) and the [Ontario Electrical Safety Code, O. Reg. 164/99](#) (as amended), administered by the Electrical Safety Authority.
- The [Technical Standards and Safety Act, 2000](#), and the [Liquid Fuels Handling Code, O. Reg. 217/01](#), are administered by the Ministry of Government and Consumer Services and the Technical Standards and Safety Authority.
- The [Propane Storage and Handling Regulation, O. Reg. 211/01](#), the [Compressed Gas Regulation, O. Reg. 214/01](#) and the Natural Gas Code are administered by the Ministry of Government and Consumer Services and the Technical Standards and Safety Authority.
- National Building Code (NBC) and Commentaries are administered by the Federal Government.
- National Fire Code (NFC) and Commentaries are administered by the Federal Government.

C. Canadian, American, European and international standards

Standards flagged with an asterisk (*) have been reviewed by Ministry of Labour engineers and are accepted by the Ministry of Labour as good engineering practice needed to comply with section 7 of the [Industrial Establishments Regulation](#). Standards not flagged with an asterisk have not been reviewed by the ministry. Such standards must be reviewed by a P. Eng. (professional engineer) to ensure that adherence to them would satisfy all the requirements of the regulation that are listed in the PSR table.

CSA standards

CSA - International (CSA) publications that may apply are referenced in many codes, and provide guidance on the acceptable means of safeguarding of specific equipment and processes.

- CAN/CSA-Z142 (2010)* – Code for Punch Press and Brake Press Operation: Health, Safety, and Guarding Requirements
- CAN/CSA-Z434 (R2013)* – Industrial Robots and Robot Systems-General Safety
- CAN/CSA-Z615 (R2006)* – Code for Hot Forging Producers, Health and Safety Requirements
- CAN3-Z180.1 (2012)* – Compressed Breathing Air and Systems
- CSA-B51 (2014)* – Boiler, Pressure Vessel, and Pressure Piping Code
- CSA-B52 (2013)* – Mechanical Refrigeration Code
- CSA-W117.2 (2012)* – Safety in Welding, Cutting and Allied Processes
- CSA-Z432 (2014)* – Safeguarding of Machinery

ANSI standards

American National Standards Institute (ANSI) publications that may apply are referenced in many codes, and provide guidance on the acceptable safeguarding of specific equipment and processes.

- ANSI/B11.01 (2009)* – Mechanical Power Presses
- ANSI/B11.02 (2013)* – Hydraulic Power Presses
- ANSI/B11.03 (2012)* – Power Press Brakes (OSHA-CPL 2-1.25)
- ANSI/B11.04 (2003)* – Shears
- ANSI/B11.5-1988 (R94) – Iron Workers
- ANSI/B11.06 (2001)* – Lathes
- ANSI/B11.7-1995 (R00) – Cold Headers and Cold Formers
- ANSI/B11.08 (2001)* – Drilling, Milling, and Boring
- ANSI/B11.9-1975 (R97) – Grinding Machines
- ANSI/B11.10-1990 (R98) – Sawing Machines
- ANSI/B11.11-1985 (R94) – Gear Cutting Machines
- ANSI/B11.12-1996 – Roll Forming and Roll Bending
- ANSI/B11.13-1992 (R98) – Automatic Screw/Bar and Chucking Machines
- ANSI/B11.14-1996 – Coil Slitting Machines
- ANSI/B11.15-1984 (R94) – Pipe, Tube, and Shape Bending Machines
- ANSI/B11.16-1988 – Metal Powder Compacting
- ANSI/B11.17-1996 – Horizontal Hydraulic Extrusion Presses
- ANSI/B11.18-1997 – Coil Processing Systems
- ANSI/B11.19 (2010)* – Safeguarding Methods
- ANSI/B11.20 (2004)* – Manufacturing Systems/Cells
- ANSI/B11.21 (2006)* – Machines Using Lasers
- ANSI/B65.1 (2011)* – Printing Press Systems
- ANSI/B65.2 (2011)* – Binding and Finishing Systems
- ANSI/B65.5 (2006)* – Stand Alone Platen Presses
- ANSI/O1.1-1992 – Woodworking Machinery-Safety Requirements
- ANSI/Z244.1-2003 – Lockout/tagout of Energy Sources
- ANSI/Z268.1-1982 – Metal Scrap Processing Equipment
- ANSI/ALI ALCTV-2011* – Automotive Lifts-Safety Requirements for Construction, Testing and Validation
- ANSI/ALI ALOIM-2008* – Automotive Lifts-Safety Requirements for Operation, Inspection and Maintenance
- RIA/ANSI/15-06 – 2012* – Industrial Robots and Robot Systems
- ANSI/SPI B151.1 – 2007* – Horizontal Injection Moulding Machines
- ANSI/SPI B151.27-1998 – Robots Used with Horizontal Injection Moulding Machines
- ANSI/Z245.1-2012* – Mobile Wastes and Recyclable Materials Collection, Transportation, and Compacting Equipment Safety Requirements (Note: See additional requirements issued by the Ministry of Labour in guidelines entitled: [Mobile Compacting Equipment Safety Guidelines](#))
- ANSI/Z245.2-1997 – Refuse Collection, Processing, and Disposal Equipment-Stationary Compactors – Safety Requirements
- ANSI/Z245.5-1990 – Baling Equipment

World standards

International Standards Organization (ISO) and European Norm (EN) Standards, International Electrotechnical Commission (IEC) publications that may apply are referenced in many codes.

They provide guidance on acceptable safeguarding of specific equipment and processes.

Type A standards

Type A standards define fundamental concepts and general design principles that apply to all types of machinery.

- ISO-12100-1 and 2* – Safety of machinery: basic concepts, general principles for design
- ISO-14121* – Safety of machinery – principles of risk assessment
- IEC-61508 (parts 1, 2, 3, 4, 5) – Functional safety of electrical/electronic/programmable electronic safety related systems

Type B standards

Type B standards are concerned with a particular aspect of safety and apply to most machinery.

- 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-13855 – Hand/arm speed – approach speeds of the human body for positioning protective 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 and without guard locking
- ISO 13856* (4 parts) – Pressure sensitive protective devices
- IEC 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 behaviour under fault conditions
- ISO 4413 – Safety requirements for fluid power systems and components – hydraulics
- ISO 4414* – Safety requirements for fluid power systems and components – pneumatics
- IEC/EN 61496 Parts 1 and 2*
 - Part 1: Electro sensitive protective equipment – sensing safeguards
 - Part 2: Active opto-electronic protective devices – light curtains

Type C standards

Type C standards give minimum safety instruction for a specific group of machinery.

Machines for cold working of metals:

- EN 692 – Mechanical presses
- EN 693 – Hydraulic presses, press-brakes, pneumatic presses

Rubber and plastic machines:

- EN 201 – Injection moulding machines
- EN 289 – Compression and transfer moulding presses
- EN 422 – Blow moulding machines intended for the production of hollow articles
- EN 1114 – Extruders and extrusion lines
- EN 1417 – Two roll mills
- EN 1612-1 – Reaction moulding machines

Packaging machines:

- EN 415-1 – Common requirements
- EN 415-2 – Machines for preformed rigid packaging
- EN 415-3 – Form, fill and seal machines
- EN 415-4 – Palletizers and depalletizers
- EN 415-5 – Wrapping machines
- EN 415-6 – Machines to form collective packaging

- EN 415-7 – Machines to ensure cohesion of load units

Food processing machines:

- EN 1978 Vegetable cutting machines
- EN 1974 Slicing machines

Wood working machines:

- EN 848-1 – One-side moulding machines with rotating tool
- EN 848-3 – Numerically controlled (NC) boring and routing machines
- EN 859 – Hand fed surface planing machines
- EN 860 – One side thickness planing machines
- EN 861 – Surface planing and thickening machines
- EN 940 – Combined wood working machines
- EN 1218-2 – Tenoning machines – part 2: double-end tenoning and/or profiling

Machines fed by chain(s):

- EN 1218-4 – Tenoning machines – part 4: edge banding machines fed by chain or chains
- EN 1870-13 – Safety of woodworking machines – circular sawing machines - horizontal beam panel sawing machines
- EN 12750 – Four sided moulding machines

Tannery machines:

- EN 972 – Reciprocating roller machines
- EN 930 – Roughing, scouring, polishing, and trimming machines
- EN 931 – Footwear manufacturing machines. Lasting machines
- EN 1035 – Moving plate machines
- EN 1845 – Footwear moulding machines

Miscellaneous:

- EN 775 – Manipulating industrial robots
- EN 1525 – Industrial trucks – driverless trucks and their systems
- EN 10472 – Industrial laundry machinery
- EN 11111 – Textile machinery
- EN 12626 – Laser processing machines

D. Codes, standards, manuals and handbooks

The codes, standards, manuals and handbooks listed below are not current applicable standards, but are general guidance documents that may be referred to during a pre-start health and safety review.

1. American Conference of Governmental Industrial Hygienists (ACGIH), Industrial Ventilation, A Manual of Practice
2. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) handbooks
3. CAN3-S16.1, Steel Structures for Buildings – Limit States Design
4. CAN3-S136, Cold Formed Steel Structural Members
5. CAN3-S157, Strength Design in Aluminum
6. The Civil Engineering Handbook editors: W.F. Chen, J.Y. Richard Liew, CRC Press 2002, 2nd. Edition.
7. CAN3-O86, Engineering Design in Wood
8. Factory Mutual Systems Industrial Loss Prevention
9. Matheson Gas Data Book, Matheson Division of Searle Medical Products USA, Inc.
10. National Fire Protection Association (NFPA) Standard and Codes of Practice and Fire Protection Handbook
11. National Institute for Occupational Safety and Health (NIOSH) Industrial Environment, its Evaluation and Control
12. Ontario Ministry of Labour - Health and Safety Guidelines, Engineering Data Sheets and Hazard Alerts
13. John Wiley & Sons, Patty's Industrial Hygiene and Toxicology

14. Perry's Chemical Engineers' Handbook
15. Irving Sax, Dangerous Properties of Industrial Materials
16. Standard Handbook for Electrical Engineers
17. Standard Handbook for Mechanical Engineers
18. Underwriters Laboratories Canada (ULC) Standards
19. PLUS 2203 HAZLOC-94, Hazardous Locations: A Guide for the Design, Construction and Installation of Electrical Equipment in Explosive Atmospheres by John A. Bossert (Available from CSA ISBN 0-921347-39-1)

[Previous](#) | [Next](#)

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Appendix II: Glossary of Acronyms and Organizations

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|--------|--|
| ACGIH | <u>American Conference of Governmental Industrial Hygienists</u> |
| ANSI | <u>American National Standards Institute</u> |
| AS | <u>Australian Standards</u> |
| ASHRAE | <u>American Society of Heating, Refrigerating and Air-Conditioning Engineers</u> |
| ASME | <u>American Society of Mechanical Engineers</u> |
| CEO | <u>Consulting Engineers of Ontario</u> |
| CSA | <u>Canadian Standards Association</u> |
| EN | <u>European Norm</u> |
| ESA | <u>Electrical Safety Authority</u> |
| HSR | <u>Health and Safety Representative</u> |
| IEC | <u>International Electrotechnical Commission</u> |
| ISO | <u>International Organization for Standardization</u> |
| JHSC | <u>Joint Health and Safety Committee</u> |
| JIS | <u>Japanese Industrial Standards</u> |
| NFC | <u>National Fire Code of Canada</u> |
| NFPA | <u>National Fire Protection Association</u> |
| OBC | <u>Ontario Building Code</u> |
| OESC | <u>Ontario Electrical Safety Code</u> |
| OFC | <u>Ontario Fire Code</u> |
| P.Eng. | Professional Engineer |
| PEO | <u>Professional Engineers Ontario</u> |
| RMI | <u>Rack Manufacturers Institute</u> |
| SEMA | <u>Storage Equipment Manufacturers Association</u> |
| TSSA | <u>Technical Standards and Safety Authority</u> |

[Previous](#)

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