

Manufacturing Safety Alliance of BC

Overhead Crane Webinar Regulatory Requirements

- Gantry
- Jib
- Bridge
- Monorail

July 30, 2025


Presented by:
Occupational Safety Officer
Len Tarling, CRSP.
250-470-1704
len.tarling@worksafebc.com

Learning objectives

- The objective of today is to familiarize:
 - Employers
 - Vendors
 - Industry Associations
 - Unions and Workers
- With the requirements of the Occupational Health and Safety Regulations (OHSR) for crane design, construction, erection and operation.

Introduce yourself and review the learning objectives

Occupational Health and Safety Regulations (OHSR) Part 14 – Cranes and Hoists

- The symbol  **STOP USE** is shown where non-compliance with the regulation will result in a Stop Use order of the crane until compliance is met



I will review the Occupational Health and Safety Regulations and guidelines to familiarize the audience with what they can expect to be required when buying a crane or having an inspection by WorkSafeBC.

OHSR Part 14 – Cranes and hoists

Part 14 of the OHSR speaks to the requirements of other types of cranes including but not limited to:

- Mobile crane
- Articulating/Telescoping boom truck
- Tower and hammerhead
- Self Erecting
- Portal, tower or pillar
- Construction Material Hoist
- Chimney hoist



Gantry crane

- Gantry Cranes are a type of overhead crane that is built on a gantry
- A gantry is a movable framework that supports large equipment
- They can be mounted on wheels or rails



Jib crane

- Jib cranes look kind of like an upside-down letter L
- They are usually floor mounted via their own dedicated support or to a building's support beam or crane super structure
- Jib cranes are usually equipped with an electric chain hoist and can be rotated by hand. This makes them very efficient at doing many lifts over short distances



Bridge crane



- Bridge cranes are typically built inside of a building and will normally use the structure of the building as it's support.
- They can also be free standing on their own support structure.
- An overhead bridge crane almost always has a hoist which will move left or right.

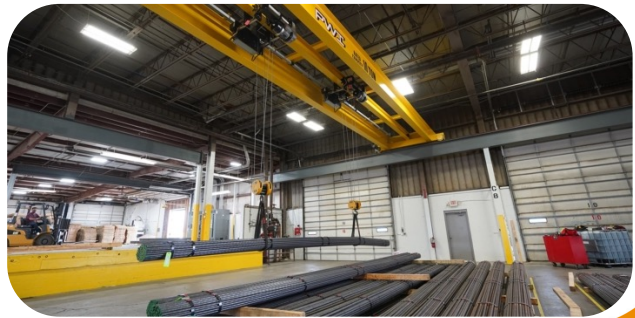
Bridge cranes

- Bridge cranes come in two common variations; single girder and double girder.
- Bridge girders are the beams that span across the runways.

Single Girder



Double Girder



Overhead travelling crane

ASME B30.17-2003

Definition - crane, overhead:

- a crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead, fixed runway structure.



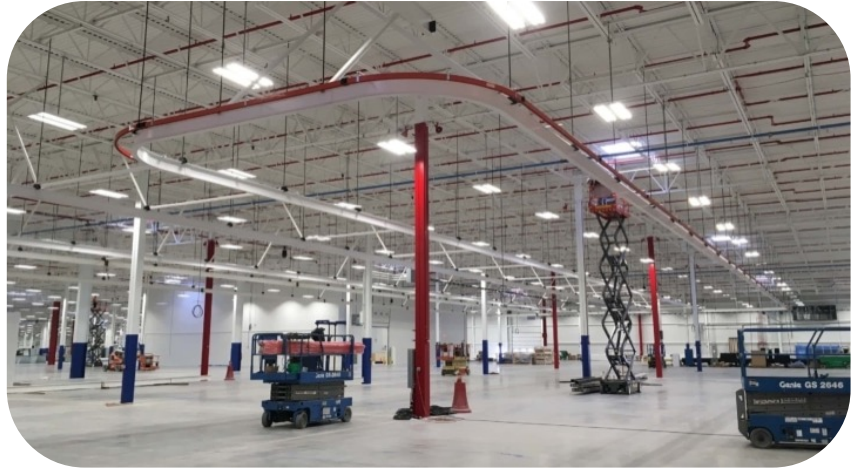
Overhead travelling crane

- These are bridge cranes which run on a set of rails allowing the whole system to move forward or backwards along the length of the rails in the building.
- Electric overhead travelling cranes are driven by drive wheels on the trolleys allowing the operator to move the girder up and down the length of the rails.



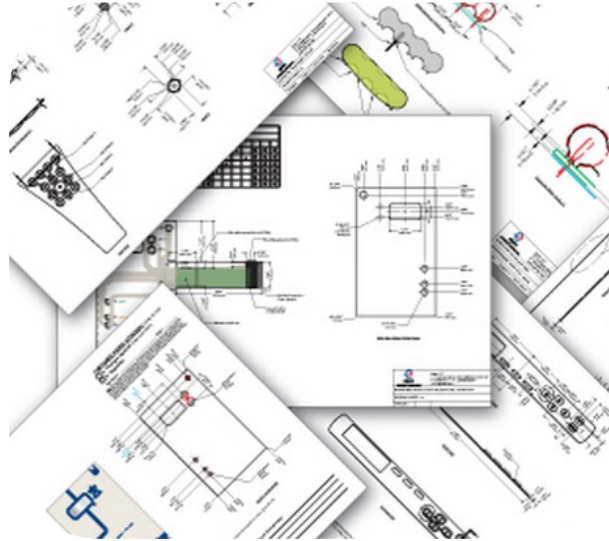
Monorail crane

- Monorail cranes run on a single beam
- Their hoist doesn't move side to side like that of a normal bridge crane, it just goes up and down
- Monorail crane rails can be formed to adjust for curves



OHSR Part 14.2(1) – Cranes and Hoists

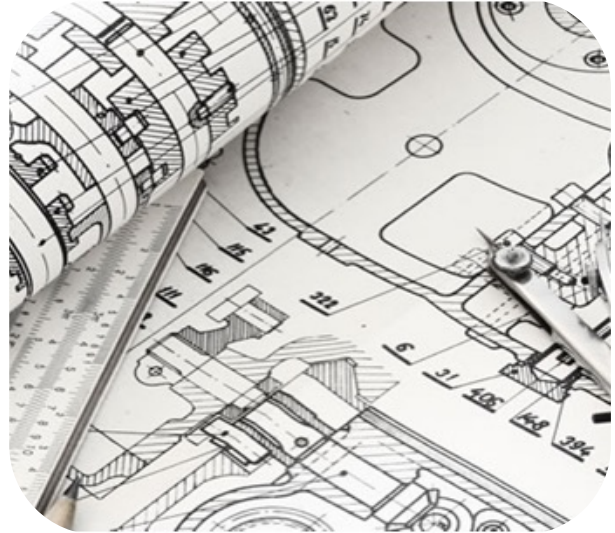
- The crane manufacturer or professional engineer has a responsibility to ensure that the requirements are addressed when they design a crane
- Documentation from a reputable crane manufacturer or a professional engineer (documents must be stamped by an engineer with the EGBC)



OHSR 14.2 (1) Except as otherwise required by this Regulation, a crane or hoist must be designed, constructed, assembled, erected, climbed, repositioned, adjusted, disassembled, dismantled, inspected, maintained and operated as specified by the manufacturer or a professional engineer, and to meet the requirements of the applicable standard listed in subsections (2) to (15).

Electrical

- This design requirement for electrical is in reference to any engineering and build completed that includes electrical wiring. (ie: the drive motors on the top of an overhead travelling bridge crane)
- This does not apply to an electric hoist that has been purchased assembled as a “plug and play” unit.
- The employer must ensure that these units meet the applicable standards required.



13

OHSR 14.2 (2)

A bridge, jib, monorail, gantry or overhead travelling crane must meet the design requirements for electrical components and functions of

- *CSA Standard C22.1-94, Canadian Electrical Code, Part 1, Section 40 and*
- *CSA Standard C22.2 No. 33-M1984 (Reaffirmed 1992), Construction and Test of Electric Cranes and Hoists.*

Design standard

OHSR 14.2 (3)

- Must meet ANSI Standard
- Crane Manufacturers Association of America (CMAA) Specifications
- Design drawing from manufacture or engineer of the crane



14

OHSR 14.2 (3)

A bridge, jib, monorail, gantry or overhead travelling crane must meet the design requirements of:

- (a) ANSI Standard MH27.1-2003, Specifications for Patented Track Underhung Cranes and Monorail Systems, * Not common – special design monorail/crane systems
- (b) Crane Manufacturers Association of America (CMAA) Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes - No. 70 (2004), or
- (c) Crane Manufacturers Association of America (CMAA) Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2004).

Note: G14.2 (3)(c) states that CMAA 74-2015 is also an acceptable standard

Generally looking from a design drawing from the manufacturer or PE of the crane

Overhung trolley & hoist



Underhung trolley & hoist

Design standard

- OHSR 14.2(15)
 - Must meet good engineering practice
- EGBC states that good engineering practice would include reference to a design standard that was followed to build these types of cranes.
- Example: a manual overhead single girder crane with underhung trolley and hoist would reference the CMAA 74-2004 Standard.



16

EGBC requires a "shop drawing" which should include:

- Manufacturer identification and Model number;
- Installation arrangement;
- Material sizes;
- Construction details;
- Dimensions and Weight;
- Operating characteristics as they relate to the use of application;
- Operating performance and curves with clearly-indicated performance range(s);
- Equipment efficiency and Duty cycles;
- Electrical classification, data and characteristics;
- Approvals, Sound levels and Vibration levels.

OHSR 14.2 (5) thru (14) - speak to cranes not covered in this presentation.

OHSR 14.2 (15)

A crane or hoist of a type not covered by the standards specified in subsections (2) to (14) must meet **good engineering practice** and be able to safely perform its function. (This would include monorail, jib and non-electrically driven overhead gantry and bridge cranes)

Safety standard

- The employer must choose a standard to follow for maintenance, repair and testing and ensure the crane is maintained and inspected in accordance too that standard
- CSA B167-98 is commonly used, other standards are available
- The standards speak to a frequency of testing dependent on the severity of use. (ie: under 20 lifts a day not exceeding 50% of rated capacity)
- These standards also speak to the initial testing of the cranes once installed
- OHSR override the standards



17

Manufacturer's and employer's must ensure that they consult the WSBC regulations for requirements that may be more prescriptive than the standard.

OHSR 14.2 (4) A bridge, jib, monorail, gantry or overhead travelling crane must meet the safety requirements of

(a) CSA Standard B167-96, Safety Standard for Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists, and Trolleys,

(b) ANSI Standard ANSI/ASME B30.2-2005, Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist),

(c) ANSI Standard ANSI/ASME B30.11-2004, Monorails and Underhung Cranes,

(d) ANSI Standard ANSI/ASME B30.16-2003, Overhead Hoists (Underhung), or

(e) ANSI Standard ANSI/ASME B30.17-2003, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist).

Identification and capacity

A crane or hoist must be permanently identified by the legible display of:

- The manufacturer's name
- Model
- Serial number on the structure



18

OHSR 14.3 (1) - Identification

A crane or hoist must be permanently identified by the legible display of the manufacturer's name, model and serial number on the structure.

(This could be the actual super structure, but is typically on the bridge)

Capacity

- Design drawings usually state "ton"
- Hoists that are pre-assembled and sold will normally be marked in "tonne".
- Capacities must match all in tonne or ton. They cannot be interchanged
- The manufacturer or PE should identify the hoist to be used and ensure the drawings match the capacity of the hoist.

Example

- 1 Ton = 2,000lbs (907.18kg)
- 1 Tonne = 2,204.62 lbs (1,000kg)
- A rated 5 tonne hoist mounted on a 5 ton structure can be over capacity on the structure by 1,023.00 pounds



19

OHSR 14.5 (1) - Rated Capacity

The rated capacity of a crane or hoist, other than a crane or hoist to which subsection (2) or (3) applies, must be permanently indicated on each of the following:

- (a) the superstructure;
- (b) the hoist;
- (c) the load block.

OHSR 14.5 (2)

The rated capacity of a monorail crane must be permanently indicated on each of the following:

- (a) the hoist;
- (b) the load block;
- (c) the monorail beam, at intervals not exceeding 10 m (33 ft).


These capacities must match ie: all ton or all tonne. Cannot be interchanged!

Support structure

Non-compliance has generally been found where multiple cranes on the same super structure that are used simultaneously have not been tested accordingly

or



Do not have limiting switches to restrict the combined use of two cranes on one part of the structure.

This will result in  **STOP USE**



20

OHSR 14.11 - Support Structure

- (1) The rated capacity of a crane or hoist must not exceed the rated capacity of the structure supporting the crane or hoist.  **STOP USE**
- (2) Selector switches or other effective means must be provided to ensure that the supporting structure is not overloaded by simultaneous use of multiple cranes or hoists installed on the supporting structure.  **STOP USE**

Manual and Instructions

OHSR 14.12(2)

- Manual prepared by the manufacture of the crane, or hoist
- If manual is not available, an engineer's instructions for the crane or hoist.

These must be available on the job site for reference by the operator or persons inspecting or maintaining the crane.



Will typically as to see these during and inspection

OHSR 14.12 (2) A crane or hoist must not be used unless the following is reasonably accessible to the equipment operator and other persons inspecting or maintaining the equipment at the workplace where the crane or hoist is to be used:

(a) the manufacturer's manual for the crane or hoist - means a manual, prepared by the manufacturer of a crane or hoist, that describes approved methods for assembly, erection, climbing, repositioning, adjustment, disassembly, dismantling, inspection, maintenance and operation of the component parts of the crane or hoist and of the assembled crane or hoist.

(b) if the manufacturer's manual is not available, an engineer's instructions for the crane or hoist. - means instructions, approved in writing by a professional engineer, for the assembly, erection, climbing, repositioning, adjustment, disassembly, dismantling, inspection, maintenance and operation of the component parts of a crane or hoist and of the assembled crane or hoist.

Inspection maintenance and repair

- Inspected and maintained at a frequency and to the extent required
- Refer to the standard you are following
- Considerations:
 - What does the manufacturer's manual state?
 - What type of use is the crane to be subjected to
 - Does the crane inspector meet the requirements of the standard
- Records of inspection and maintenance



22

I have found that the manuals do not always refer to the severity of the use, which could trigger more stringent inspectional criteria.

OHSR 14.13 (1) Each crane and hoist must be inspected and maintained at a frequency and to the extent required to ensure that every component is capable of carrying out its original design function with an adequate margin of safety.

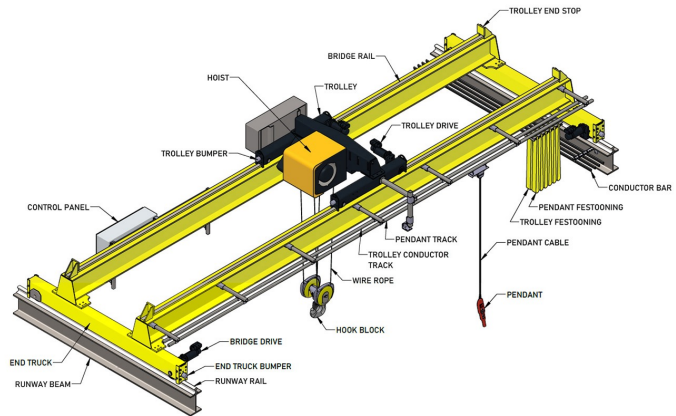
OHSR 14.14 Records of inspection and maintenance meeting the requirements of Part 4 (General Conditions) must be kept by the equipment operator and other persons inspecting and maintaining the equipment, for:

(a) a crane or hoist with a rated capacity of 900 kg (2 000 lbs) or more,

Modifications

What if modifications are needed?

Or the crane needs to be moved?



23

Non-compliance has been found where employers have moved the crane in the shop, had it repaired after an incident or "added" to the structure.

OHSR 14.15

(1) Each crane or hoist must be ***assembled, erected, climbed, repositioned, adjusted, disassembled, dismantled, inspected, maintained and operated*** as specified by the manufacturer's manual unless otherwise approved by the original equipment manufacturer or a professional engineer.

(2) If a modification that affects the rated capacity or safe operation of a crane or hoist is made to its structure, to one of its mechanical components or to its control system, the crane or hoist must:

- (a) be assessed,
- (b) have its rated capacity adjusted as necessary, ***and***
- (c) be certified as safe for use.

Certification required

OHSR 14.16(2)

A person must not use a crane or hoist described in subsection (1) unless a professional engineer has certified the rated capacity of the crane or hoist in accordance with the applicable design or safety standard specified in section 14.2.

 **STOP** USE order




24

OHSR 14.16

(1) Subsection (2) applies in respect of a crane or hoist if

- (a) the origin or rated capacity of the equipment is not available,
- (b) the continued safe use of the equipment cannot be assured because of its condition, age or history, or

(c) modifications referred to in section 14.15 that affect the rated capacity have been made to the crane or hoist.

(2) A person must not use a crane or hoist described in subsection (1) unless a professional engineer has certified the rated capacity of the crane or hoist in accordance with the applicable design or safety standard specified in section 14.2.  **STOP USE order**

These changes have not had certification of the crane and a new testing completed.

Misadventure

Misadventure is defined as:

- a contact, other than a contact that is consistent with operation as specified by the manufacturer or a professional engineer,
- a shock load,
- a loss of a load,
- a brake failure,
- an upset, or
- any other circumstance that may impair the safe operation of the crane or hoist


25

OHSR 14.16.1

(1) In this section, "misadventure" means

- (a) a contact, other than a contact that is consistent with operation as specified by the manufacturer or a professional engineer,
- (b) a shock load,
- (c) a loss of a load,
- (d) a brake failure,
- (e) an upset, or
- (f) any other circumstance that may impair the safe operation of the crane or hoist.

Certification following a misadventure

A  **STOP USE order** will be issued until the following has been completed

A professional engineer has:

- (a) supervised an inspection of, and supervised any necessary repairs to, the equipment, and
- (b) certified the equipment as safe for use at the manufacturer's rated capacity for the equipment or as provided by section 14.16 if the manufacturer's rated capacity is not available.

Drop Stops

- Means to limit the drop of the crane, trolley and bridge truck frames if a tire, wheel or axle fails
- Must be able to support the trolley, bridge and gantry with the crane or hoist loaded to its rated capacity

and

- Must be certified to be able to do so by the original equipment manufacturer or a professional engineer



27

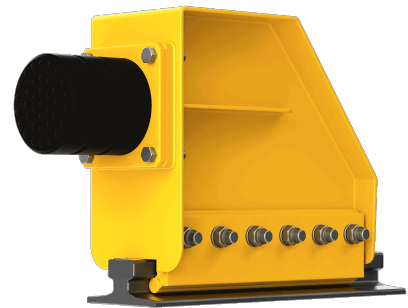
A visual inspection will quickly determine if drop stops are in place and look reasonable for the application.

OHSR 14.19 - Drop stops

- (1) A top-running crane, under-running crane, wheel- or rail-mounted gantry crane, tower crane and monorail hoist must have a means to limit the drop of the crane, trolley and bridge truck frames to 25 mm (1 in) if a tire, wheel or axle fails.
- (2) Drop stops must be able to support the trolley, bridge and gantry with the crane or hoist loaded to its rated capacity and must be certified to be able to do so by the original equipment manufacturer or a professional engineer.

Rail end stops and controls

- End stops must be provided on crane and hoist tracks.
- Stops must contact the truck frame or be of a specified height.
- Control function must be clearly identified and in good condition.
- Return to neutral



28

These components as well are easy to confirm thru a quick visual check.

OHSR 14.20 - Rail end stops

- (1) End stops must be provided on crane and hoist tracks and rails to prevent the equipment running off the end of the rail or track.
- (2) The stops must contact the truck frame or be of a height of at least $\frac{1}{2}$ the diameter of the wheels if the wheels contact the stops.

OHSR 14.28 - Controls

- (1) Each control for a crane or hoist must have its function clearly identified and must be maintained in good condition.
- (2) Each control for a crane or hoist that causes load movement must return to neutral when pressure from the operator is released

Operator qualifications and pre-use inspection

- A crane or hoist must only be operated by a qualified person who has been instructed to operate the equipment
- "qualified" means being knowledgeable of the work, the hazards involved and the means to control the hazards, by reason of education, training, experience or a combination thereof;
- Crane or hoist was inspected for that work shift and
- The control and safety devices were tested for that work shift



29

Does the employer have documentation on the training and experience of the operators to support this requirement?

OHSR 14.34 - Operator qualifications

- (1) A crane or hoist must only be operated by a **qualified** person who has been instructed to operate the equipment.
- (2) A person must demonstrate competency, including familiarity with the operating instructions for the crane or hoist and the code of signals for hoisting operations authorized by the Board before operating the equipment.

"qualified" means being knowledgeable of the work, the hazards involved and the means to control the hazards, by reason of education, training, experience or a combination thereof;

Pre-Use check books are generally reviewed on an inspection.

OHSR 14.35 - Pre-use inspection

- (1) Before an operator uses a crane or hoist, the operator must ensure that
 - (a) the crane or hoist was inspected for that work shift, and
 - (b) the control and safety devices were tested for that work shift.

Operational and Running Tests

Installations after January 1, 1999 and the crane has been:

- Reinstalled
- Modified or
- Rebuilt
- Must choose a safety standard as specified in OHSR 14.2 to follow when completing the initial or follow up inspection and testing of the crane
- Not performing and having evidence of the tests will result in a

 **STOP USE order**

30

This is the biggest non-compliance issue seen in the field. Proper testing to meet this regulation and the configuration of the cranes and their use are common issues not addressed in the testing.

OHSR 14.54 (1) This section applies to

(a) a bridge crane, gantry crane or overhead travelling crane that was installed after January 1, 1999, and

(b) a crane referred to in paragraph (a) or its runway that has been

- **Reinstalled**
- **modified or**
- **rebuilt.**

 **STOP USE order**

Note: The user must choose a safety standard as specified in OHSR 14.2 to follow when completing the initial or follow up inspection and testing of the crane.

Operational and running tests

Tests must include:

- All crane motions, holding and travel
- All circuits, controls, interlocks
- Sequences of operation of the equipment
- All limit switches, brakes and other protective devices
- Structural deflection
- Load must be travelled over the full length of the bridge and trolley runways.
- Record of all load tests



31

OHSR 14.54 (1.1) The following tests must be performed before the equipment described in subsection (1) is used for the first time after it has been installed, reinstalled, modified or rebuilt, as applicable:

- (a) all crane motions, holding brakes and travel brakes must be tested to meet the manufacturer's specifications and the requirements of the applicable design or safety standard for when the hook is carrying a load at rated capacity;
- (b) all circuits, controls, interlocks and sequences of operation of the equipment must be tested to ensure they are functioning properly;
- (c) all crane motions, holding brakes and travel brakes must be tested to prove the crane's ability to safely handle a load of 125% of the crane's rated capacity;
- (d) all limit switches, brakes and other protective devices must be tested to ensure they function properly when the crane is carrying a load of 100% of the rated capacity;
- (e) structural deflection must be measured with a load of 100% of the rated capacity and must not exceed the allowable deflection specified by the applicable design standard;
- (f) the load must be **travelled over the full length of the bridge and trolley runways during the load tests at 100% and 125% of rated capacity**, and only the parts of runways that have been successfully load tested may be placed into service.

(2) A record of all load tests must be included in the equipment record system giving details of the tests and verification of the loads used and be signed by the person

conducting the tests.

Qualified Riggers

- Work must be done by or under the direct supervision of qualified workers familiar with the rigging to be used and with the code of signals authorized by the Board for controlling hoisting operations
- WorkSafeBC is currently working on a list of competencies for riggers
- Employer's currently have the duty to provide information, instruction, training and supervision under the ACT

WORKSAFE BC

WorkSafe Bulletin

Preventing crane rigging failures

Crane rigging failures have caused serious injuries and fatalities on B.C. construction sites. Rigging (fibre or wire ropes, chains, slings, attachments, etc.) that can lift thousands of kilograms may fail catastrophically. This bulletin provides an overview of how rigging failures typically happen and how to reduce the risks.

What are the hazards?

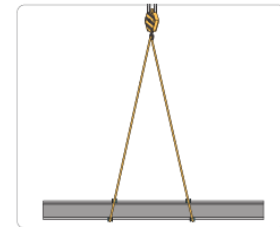
- Sharp edges of suspended loads can damage rigging.
- If a load shifts, the rigging may fail or the load may fall from the rigging.
- A suspended load can fail if it has insufficient structural integrity for the forces imposed on it during a lift.

Responsibilities

Everyone involved in moving a load with a crane has a role to play in preventing rigging failures.

Employers must:

- Provide the information, instruction, training, and supervision necessary to ensure that crane



A beam suspended from a crane by a sling.



32

How does the employer show due diligence to this training requirement.

OHSR 15.2

Rigging and slinging work must be done by or under the direct supervision of qualified workers familiar with the rigging to be used and with the code of signals authorized by the Board for controlling hoisting operations

"qualified" means being knowledgeable of the work, the hazards involved and the means to control the hazards, by reason of education, training, experience or a combination thereof;

Note – WorkSafeBC is currently working on a list of competencies for riggers.

Employer's currently have the following duty under WCA21(2)(e):

provide to the employer's workers the information, instruction, training and supervision necessary to ensure the health and safety of those workers in carrying out their work and to ensure the health and safety of other workers at the workplace,

Contact

Health & safety assistance Prevention Information Line

For help with workplace health and safety issues, e.g., requesting a consultation, reporting unsafe work.

Phone toll-free (Canada):

1.888.621.7233 (1.888.621.SAFE)

Monday to Friday

8:05 a.m. to 4:30 p.m.

Crisis & critical incident support

Crisis support line

Call us if you or your family is in emotional crisis.

Phone toll-free (Canada):

1.800.624.2928

7 days a week, 24 hours a day

[More >](#)

Critical incident response

Contact us for assistance if you've witnessed a traumatic workplace incident.

Phone (toll-free answering service)

(B.C. and Alberta):

1.888.922.3700

7 days a week

9 a.m. to 11 p.m.