

Overview of proposed amendments to

Part 14: Cranes and Hoists Section 14.91, Hoisting ropes

Several types of non-rotating wire ropes are available and in use on tower cranes. Because two layer non-rotating wire rope load lines of 19x7 and 8x19 construction are subject to abrasion and fatigue, section 14.91 requires a portion of the rope be removed periodically to shift the section of the rope subject to the worst wear.

A newer type of non-rotating wire rope is also available and in use which is far more durable for the same operating conditions. This rope has 14 or more outer strands or has an inner core that is coated with plastic, and meets the 2004 CSA Standard for tower cranes. These types of rope are less susceptible to the abrasion and fatigue problems and can be damaged by periodic shortening.

The proposal clarifies that the interval for shortening the rope is 500 hours of use and excludes non-rotating wire ropes with 14 or more outer strands or with a plastic coated inner core from the requirement to periodically shorten the hoisting rope.



PART 14: CRANES AND HOISTS

TOWER CRANES

- Hoisting ropes** **14.91** (1) ~~The~~ **A rotation resistant** hoisting rope on a tower crane must be shortened by the removal of 3 m (10 ft) **of rope** at the dead end after every **500 hours** ~~3 months~~ of use unless
- (a)** otherwise specified by the ~~manufacturer~~ **rope manufacturer,**
 - (b)** **the rope has 14 or more outer strands, or**
 - (c)** **the rope has a plastic coated inner core.**
- (2) The hoisting rope on a tower crane must be properly seized before cutting.
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Explanatory Note

The first proposed change to section 14.91 (1) is to clarify the interval for shortening the hoisting rope to take into account actual operating time. The original intent of section 14.91 (1) to require the rope to be shortened “after every 3 months of use” was based on the tower crane being used regularly during a normal “8 hour” shift, five days a week over the 3 month period. This is equivalent to approximately 500 hours of operating time for the crane. Under current wording, if the crane is used more than 8 hours each working day (for example for a “double shift” of 16 hours each work day) the employer is under no obligation to adjust this 3 month period to take into account this increase in service time. The hoisting rope would not necessarily be shortened at an interval that would maintain the integrity of the rope and thus ensure worker health and safety. On the other hand, if the crane is not used regularly throughout each shift, or is not used every day of the normal work week, the employer is still required to shorten the rope after 3 months of use even though this procedure is not needed to maintain the integrity of the rope at that time. This proposed change requires the employer to track the hours of use for the crane and to shorten the rope when the number of hours in service reaches 500 hours. If the employer uses the crane for an 8 hour shift for 5 days a week, shortening of the hoisting rope would continue to be required approximately every 3 months.

The second proposed change is to create further exemptions from the requirement to shorten a rotation resistant hoisting rope periodically. Up until the 1990s, only two-layer non-rotating wire rope load lines of 19x7 and 8x19 construction were typically used on tower cranes. The construction of the rope was problematic because the strands on the outer layer cross over the strands of the inner layer to give the wire rope the non-rotating characteristic. This causes very high notching stresses which result in nicking on the individual wires. The nicking reduces the cross-sectional area of the individual wires and increases the stress. This problem is compounded by the rope path that includes several reverse bends over a short rope distance, creating a fatigue problem. The damage occurs inside the rope and cannot be detected by visual inspection.

By removing a portion of the wire rope at the dead end, the section of rope subjected to the worst wear is periodically shifted, somewhat reducing the compound problem of abrasion and fatigue and mitigating the risk of premature catastrophic failures. These types of hoisting ropes are still in use.

Wire rope now available has characteristics that make it far more durable for the same operating conditions and meet *CSA Standard Z248-04*. This three-layer non-rotating wire rope has 14 or more outer strands or has an inner core that is coated with plastic. It does not benefit from periodically removing a short length from the dead end. Also, it is difficult to cut this type of wire

**PROPOSED AMENDMENTS FOR PART 14: CRANES AND HOISTS
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rope, seize the end and re-reeve it without causing damage to the rope. These types of hoisting ropes are also in use on tower cranes.

The proposed amendment to section 14.91 (1) of the *Occupational Health and Safety Regulation* would specify which rope is subject to periodic shortening. This would mean that the non-rotating wire ropes that have 14 strands or more or that have a plastic coated inner core would not be subject to this requirement.



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PART 14: CRANES AND HOISTS

TOWER CRANES

- Hoisting ropes** **14.91** (1) A rotation resistant hoisting rope on a tower crane must be shortened by the removal of 3 m (10 ft) of rope at the dead end after every 500 hours of use unless
- (a) otherwise specified by the rope manufacturer,
 - (b) the rope has 14 or more outer strands, or
 - (c) the rope has a plastic coated inner core.
- (2) The hoisting rope on a tower crane must be properly seized before cutting.