

Properly Install, Inspect, and Load Test Overhead Patient/Resident Track Lifts

This bulletin briefly describes the causes of an accident involving an overhead patient/resident track lift system¹ and actions required by employers, lift suppliers, installers, and workers to prevent recurrence of such an incident.

Overhead track lift system accident

Two caregivers and a resident at an extended care facility were injured when an overhead patient/resident track lift support system failed while being used for the first time with a resident.

The primary cause of the accident was failure to properly install one of the track suspension components supporting the end of the track. When the hoist supporting the resident was moved to a position on the track that was directly under the improperly installed suspension component, the track, hoist, and resident fell to the floor.

Proper installation, inspection, and load testing of the track lift system prior to putting it into service would have prevented this accident. Such preventive activities are required by regulation and considered part of effective risk management standards.

Overhead track lifts can prevent injuries

Overhead patient/resident track systems are increasingly being used in hospitals, nursing homes, private homes, and group homes. When

properly installed, inspected, tested, maintained, and operated, overhead track systems minimize the risk of overexertion injury—the most common type of injury to caregivers.

When installing, inspecting, testing, and using overhead track lift systems, reference must be made to applicable safety standards, the *Workers Compensation Act* (the *Act*) and the Occupational Health and Safety Regulation² (OHSR) requirements, including those discussed below.

Safety standards for patient/resident lifts

The *Act* and OHSR are primarily concerned with the safety of *workers* as defined under the *Act*. In general, these devices lift patients and residents, rather than workers. Note also that the safety precautions taken for lifting people are more stringent than the safety precautions for lifting materials. Therefore, compliance with the requirements of the OHSR and the *Act* regarding the lifting of *materials*, does not necessarily mean that a device is safe for lifting *people* and may not satisfy effective risk management standards.

¹ These overhead systems for lifting patients, residents, and other people are sometimes referred to as a ceiling lift, H-gantry, X-Y gantry, total room covering gantry, monorail, or bridge cranes.

² Copies of the *Workers Compensation Act* and the Occupational Health and Safety Regulation can be obtained from the WCB Publications and Videos Section: phone 604 276-3068 or 1 800 661-2112, local 3068, fax 604 279-7406, or at <<http://www.worksafebc.com>>.



There are several standards dealing with lifting devices in general, and patient/resident lifting devices in particular, that should be considered prior to installing a patient/resident lift.

A Canadian and a European standard not referenced by the OHSR, but which are intended for patient/resident lifts, are as follows:

- *CAN/CSA-Z323.5-98, Mechanical/Electromechanical Lifting Devices for Persons* (CSA plans to replace this standard, in the near future, with a Technical Information Letter that provides a means of certifying these lifts.)
- *ISO 10535, Hoists for the transfer of disabled persons—Requirements and test methods*

Note that:

- The load test requirements in these standards exceed the load test requirements of OHSR section 14.54 (as explained in the specific OHSR reference sections below).
- Clause 4.2.1 of *CAN/CSA Z323.5-98* states that “the electrical portion of lifting equipment or its installation shall comply with the requirements of CSA Standard *CAN/CSA-C22.2* No. 601.1.”

According to Technical Information Letter No. MHC-08 from CSA, the electrical portion of patient lifts will be required to meet *CSA C22.2 No. 125-M1984, Electromedical Equipment*, as of February 21, 2003.

Note also that one Canadian standard referenced by OHSR clause 14.2(3)(a) is *CSA B167-96, Safety Standard for Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists, and Trolleys*. The “Scope” section of this standard states as follows:

1.1 General

This Standard specifies the minimum requirements for inspection, testing, and maintenance of overhead cranes, monorails, hoists, trolleys, jib cranes, gantry and wall

cranes, and other equipment having the same fundamental characteristics.

[Italics added.]

This type of standard is not generally sufficient for designing and testing devices used to lift people. The general assumption is that since workers are not supposed to be under lifted loads, the dropping of a load is not as serious as the dropping of a person. Hoists merely used to lift materials generally do not have as many safety features as hoists used to lift people. Therefore a prudent designer of a hoist for lifting people should, in accordance with effective risk management standards, exceed the requirements of this particular CSA standard.

Act requirements for suppliers of overhead track lift systems

Suppliers of lifts are required under section 120 of the *Act* to ensure that the product:

- Is provided with directions for its safe use;
- Is safe to use when used in accordance with directions provided by the supplier; and
- Complies with Part 3 (Occupational Health and Safety) of the *Act* and applicable sections of the OHSR.

Other Act and OHSR requirements applicable to overhead track lifts

If you are planning to install, or have already installed, overhead track lifts, the installation must meet the applicable requirements of the OHSR and the *Act*, in addition to any other applicable requirements (e.g., the local building code).

Pages 3 to 6 include references to several sections of the OHSR regarding such matters as the installation, inspection, and testing of overhead lifts—activities that, when properly conducted, would have prevented the accident described above.

Note that:

- OHSR Part 4 specifies general safety requirements;
- OHSR Part 14 is specific to cranes and hoists (including overhead lifts); and
- OHSR Part 15 specifies requirements for slings, hooks, and spreader bars.

The following information contains summaries of OHSR sections relevant to overhead track lift safety. Please refer to the OHSR for specific requirements.

Section 4.1 OHSR—Safe premises

Maintain structures, machinery, and equipment in safe condition.

Section 4.3 OHSR— Safe machinery and equipment

- Safely operate machinery and equipment;
- Inspect, test, and maintain the machinery and equipment at the intervals, and by the means, specified by the manufacturer and required standards or by a professional engineer; and
- Identify machinery and equipment that is unsafe for use and ensure it is not put into service until safe to do so.

Sections 4.3(1)(a) and 14.28(2) OHSR— Hold-to-run controls

Systems whereby the hoist automatically returns to charge or some other position, without an operator constantly at the controls, are not safe and do not meet the intent of these OHSR sections.

Section 4.11 OHSR—Startup

Ensure that all safeguards are in place and functioning before lift equipment is put into operation and that no person is exposed to undue risk by putting the equipment into operation.

Section 14.2 OHSR—General requirements

Design, construct, erect, disassemble, inspect, maintain, and operate overhead track lifts as specified by the manufacturer or a professional engineer. Load testing to other criteria or other safety items that are included in the manufacturer's instructions, and that are not specifically required by the OHSR, must also be followed.

Interchangeable components such as slings, spreader bars, and weigh scales must be compatible. Review the manufacturer's instructions for details of component compatibility.

Section 14.4 OHSR—Rated load capacity

The rated load capacity of a crane or hoist must be determined by the original equipment manufacturer or a professional engineer in accordance with the applicable design and safety standard, and must not be exceeded.

Section 14.5 OHSR— Rated load capacity indication

The rated load capacity of an overhead patient/resident track lift system must be permanently indicated (in metric units if made after January 1, 1999) on the superstructure and hoist.

The rated load capacity of a monorail type overhead track lift system must be permanently marked on the hoist and at 10 m (33 feet) intervals on the monorail beam.

Section 14.11(1) OHSR—Support structure

The rated load capacity of a hoist must not exceed the capacity of the lift support structure that supports the hoist.

Section 14.11(2) OHSR— Support structure and multiple hoists

Selector switches or other effective means must be provided to ensure that the support structure is not overloaded by multiple hoists installed on the same support structure.

Section 14.12 OHSR—Manufacturer’s manual

The manufacturer’s manual for each overhead track lift system must be reasonably available where the equipment is used, and must show the approved methods of erection, dismantling, maintenance, and safe operation.

Section 14.13 OHSR— Inspection and maintenance

Each overhead track lift system must be inspected and maintained such that each component can carry out its original design function with an adequate margin of safety. Any repairs to load bearing components must be certified by a professional engineer or the original equipment manufacturer.

Section 14.19 OHSR— Limit the drop of the trolley

The original equipment manufacturer or a professional engineer must certify that the trolley and bridge truck frames, while carrying the rated load, will continue to be supported if a wheel or axle fails. In addition, the trolley or bridge truck frame must not fall further than 25 mm (1 inch) if a wheel or axle fails.

Section 14.20 OHSR—Rail end stops

End stops must be provided on hoist tracks to prevent the equipment from running off the end of the rail or track.

Section 14.28 OHSR—Controls

All controls for an overhead track lift system must have their function clearly identified and maintained in good condition.

Section 14.34 OHSR— Qualifications of lift operators

Lifts must only be operated by a qualified person who has been instructed and authorized to use the equipment.

Section 14.38 OHSR—Unsafe lift

The operator of an overhead lift system must not attempt to move a load (e.g., person or test load) if there is any doubt that the load can be handled safely.

Section 14.42 OHSR—Multiple hoists

Any plan to install a second hoist on a lift support structure in order to use two hoists to simultaneously lift a person who weighs more than the individual rated load capacity of either hoist must be reviewed by a professional engineer or the lifting device manufacturer. Items such as those listed in OHSR section 14.42 should be considered, as well as the overall strength of individual components.

Section 14.46 OHSR—Side loading

The hook or load block of a crane or hoist must be positioned over the load to prevent side loading of the crane when the load is hoisted.

Section 14.54 OHSR—Load testing

All components must be load tested according to the requirements of the OHSR. If the manufacturer requires a load test at a different load than is specified by the OHSR, that test must also be performed (as per section 14.2(1) of the OHSR).

Overhead lifting devices generally consist of two main sets of components. The first main set of components is the lift support structure. The lift support structure consists of parts of the lifting device that are attached to or supported by the building structure. The lift support structure generally includes the support track and all other stationary parts that support the trolley and winch type mechanism. The second major set of components is the hoist. The hoist generally consists of a winch type mechanism and all other parts that connect the winch mechanism to the tracks, including the trolley.

It is critical that proper load testing of new or significantly modified lifting system installations (e.g., including the support structure and hoist) be done prior to using the lifting system with people. Load testing will determine if the lifting system can safely handle the loads imposed on it. Load testing requirements specified in the OHSR are explained below. Refer to the OHSR for specific wording.

14.54(1)(a)

Rated load capacity and proof test load

An important part of testing the installed lifting system, **prior to using it to lift persons**, is to use the system to lift specified weights of material. Generally, the lifting system is used to lift at least two different weights. The first one is a weight equal to the rated load capacity of the system. The **rated load capacity** (design load) of the system is the maximum weight that the device will ever lift during normal use. The second weight, for the purposes of this bulletin, will be called a proof test load. The **proof test load** is a load greater than the rated load capacity of the lifting system.

According to the OHSR, the proof test load must be 125% of the rated load capacity. The manufacturer may require an additional proof test load larger than 125% of the rated load capacity. Standards dealing with the design of patient/resident lifts generally require a proof test load of 150% or more of the rated load capacity.

Written safe work procedures for load testing track lift systems must be established and followed.

Before being put into service, each **hoist** must be load tested through its complete range of motion at its rated load capacity and at the proof test load. The load used to proof test and test the rated load capacity of the hoist must be lifted from the lowest point of travel (e.g., the floor) to the highest point of travel. The spreader bar and lifting sling (for persons) do not have to be used during a load test. Load tests are not to be conducted using a person for the load. Load testing of the hoist can be done at the point of manufacture or at the point of end-use.

14.54(1)(b)

Safety device testing

Part of the reason for applying a rated load capacity test load to each hoist is to ensure that any safety devices that prevent the hoist from lifting more than its rated load capacity will function when the hoist is put into service. The hoist manufacturer must provide documentation confirming that the appropriate tests have been performed. This would eliminate the need for the hoist to be totally re-tested after being installed at its point of end-use.

If the trolley is an integral part of the hoist, then the trolley must be supported in its normal manner during the load tests performed on the hoist.

14.54(1)(c)

Load testing of the lift support structure

Prior to doing any load testing of the support structure, it must be inspected and deemed safe to use for load testing. The support structure installation must ultimately be able to safely handle its rated load capacity and a proof test load equal to at least 125% of the rated capacity for each hoist on the track. The manufacturer may require a proof test load of greater than 125% of the rated load capacity.

In general, the trolley used for the load tests should be the same one that will be dedicated to that specific permanent lift installation. If a different trolley is used to load test the lift support structure, that trolley must either be the same type of trolley as the regular service trolley or a trolley that causes greater stresses on the lift support structure (e.g., by using a trolley with a shorter wheel base).

The OHSR requires that structural deflections be measured during load testing.

For a **monorail**, the suspended test load must be moved along the entire length of the track and deflection at mid-span or the end of a cantilever measured and compared to the design deflection limit.

For a **bridge crane** (e.g., H-shaped ceiling track lift), the suspended test load must be moved to one end of the bridge. The bridge must then be moved along the full length of the supporting (side) rails. The suspended load must then be moved to the other end of the bridge. Once again, the test load must be moved along the full length of the side rails. The test load must also be suspended at the centre of the bridge span and the deflection measured.

For cranes consisting of a **monorail that pivots**, the test load must be moved along the length of the monorail. The test load must then be placed in the position that will maximize the stress on the pivoting mechanism and the monorail pivoted through its complete range of motion.

Equivalent test procedures must be developed for other types of hoists and specialized components or devices such as trolley transfer mechanisms (e.g., turntables, gates, and track splitters).

Note: Only those parts of the runways or tracks that have been successfully load tested may be placed into service.

14.54(1)(d)
Testing of all motions of the installed track lift system

All motions of the overhead track lift systems must be rated as load tested, proof load tested, and tested as otherwise required by the manufacturer **before being used to lift patients, residents, or any other person.**

**Section 14.54(2) OHSR—
Records of load tests**

A record of all load tests must be kept and include details of the tests, verification of the loads used, and the signature of the person conducting the tests.

Section 15.52 OHSR—Sling identification

Synthetic fibre web slings must be permanently identified with the:

- Manufacturer's name or mark;
- Manufacturer's code or stock number;
- Working load limits for the types of hitches permitted; and
- Type of synthetic material.

Section 15.53 OHSR—Temperature restrictions for fibre web slings

Fibre web slings must not be exposed to a temperature above 82 degrees Celsius (180 degrees Fahrenheit) unless otherwise permitted by the manufacturer.

**Section 15.54 OHSR—
Synthetic web sling rejection criteria**

A synthetic web sling must be removed from service when any of the circumstances specified in OHSR section 15.54 occurs (e.g., the length of an edge cut exceeds the web thickness).

**Section 15.58 OHSR—
Working load limit of spreader bars**

Spreader bars and other specialized below-the-hook lifting devices must have their working load limit certified by a professional engineer or established by the lifting device manufacturer.

**Section 15.59 OHSR—
Identification of spreader bars**

A nameplate or other permanent marking must be on a spreader bar or other specialized below-the-hook lifting devices and display:

- The manufacturer's name and address;
- Serial number; and
- Working load limit.

