

Standards Summary Sheet

CSA Standard B167-2008 (R2015)

Overhead Travelling Cranes – Design, Inspection, Testing, Maintenance and Safe Operation

Scope and Application

This standard specifies the minimum requirements for design, inspection, testing, and maintenance (modifications and repairs) and safety operation of overhead cranes, monorails, hoists, trolleys, jib cranes, gantry and wall cranes, and other equipment having similar characteristics.

All findings as a result of inspections, maintenance, repairs, and modifications are to be recorded in a log book. The logbook is to be available for review during the entire life of the equipment.

Inspection Requirements

- Inspections are to be performed by a crane inspector having a minimum 10,000 hours of experience, or by a team having combined equivalent qualifications, under the supervision of a crane inspector or Professional Engineer.
- Critical components that affect the safe operation of a hoist or crane are to be inspected according to the manufacturer's inspection criteria or procedures. If such a list is not available, or if there is any doubt as to whether a component is safety-related, a professional engineer shall make a list of critical components and provide inspection criteria and procedures for each of the critical components.
- Inspection records are to be signed and kept in the logbook, indicating on critical components, determining that the hoist or crane is capable of lifting, lowering, supporting and operating at the maximum rated load. Verification shall be provided that the supporting structure has been designed and installed to support the maximum rated load.
- The log book is to be available to any person involved in the inspection, maintenance and/or operation of the lifting equipment.

(see over)

Inspection Classification

- General: prior to initial use, all new, reinstalled, modified, or rebuilt equipment (as per Clause 1.1 of the standard), shall be inspected by a crane inspector(s) to ensure compliance with this Standard and applicable ISO requirements, and to ensure that the supporting structure has been approved by a professional engineer to carry the maximum rated load. Records of the initial inspection, outlining the date, inspector's name, and summary of the findings, shall be kept and made available to the operator or crane inspector(s), or both.
- Inspections for cranes in regular use: inspections are divided in two categories: operational and periodic, based on the intervals at which inspections should be performed. The intervals depend on the nature of the components of the crane (as outlined in the standard) and the degree of their exposure to wear, deterioration, or malfunction.
- Inspections for cranes not in regular use: inspections are to be conducted before placing cranes into service.

Group Classification

A1 – Manually powered crane, workshop crane for assembly purposes, powerhouse crane, maintenance crane

A2 – Workshop crane for light regular use, roll-changing crane (steelwork)

A3 – Workshop crane for intermittent regular use, cranes in storage yards or scrapyards for light regular use

A4 – Workshop crane for intensive use

A5 – Container handling crane

A6 – Cranes in storage yards or scrapyards for intensive use, grab or magnet duty

A7 – Ship unloader, ladle crane (steelwork), soaking pit crane (steelwork)

A8 – Stripper crane and charging crane (steelwork)

Operational Inspection

Visual inspections shall be conducted by a qualified person (operator) at the beginning of each new shift. Observations and findings from these visual inspections shall be recorded in a daily log book and signed off at the end of each work shift.

Inspection targets – are to include examination for defects, malfunctions, and damage at intervals. This includes observations during operation for any defects or damage that might appear between periodic inspections. The correction of such defects found during inspection shall be made by a qualified person and include: all operational functions; leakage in lines, tanks, valves, pumps, and other parts of air or hydraulic systems; deformed, worn or cracked hooks; hook latches, if so equipped; hoist ropes; limit device(s) for function; function labels for operator control; and all brakes.

Periodic inspection – shall include a general visual examination of equipment and be conducted by a crane inspector. Any apparent conditions are to be recorded to provide the basis for a continuing evaluation at intervals defined below:

- (a) Service classes A1, A2 and A3 – annually
- (b) Service classes A4, A5 and A6 – semi-annually
- (c) Service classes A7 and A8 – quarterly
- (d) Special service class – as recommended by a Professional Engineer or crane manufacturer, or both
- (e) Out of service – prior to being put back into service

Verification shall be provided that the supporting structure has been designed, approved and installed to carry the maximum load as rated. The proof shall consist of one of the following methods:

- (a) a report bearing the seal and signature of a Professional Engineer stating that the supporting structure, as installed, is capable of handling the maximum load as rated;
- (b) the crane inspector has reviewed the applicable drawings bearing the seal and signature of a Professional Engineer that confirms the installed supporting structure has been designed and approved by a Professional Engineer to support the maximum load as rated;
- (c) an affidavit in the log book by the owner or employer that the supporting structure has been designed and approved by a Professional Engineer and installed to carry the maximum load as rated.

Complete inspections of the crane shall be performed at intervals noted above. Any deficiencies, such as those listed below, shall be examined to determine whether they will affect the safe operation of the crane:

- deformed, cracked or corroded members
- loose bolts or cracked welds
- sheaves and drum cracks, distortion and wear
- worn, corroded, cracked or distorted parts such as pins, exposed or open bearings, bushings, shafting, couplings, gears, bumpers and trolley stops
- glazing, scoring, warpage, contamination, or wear of electrical and mechanical brakes
- visible damage to hook, retaining nut, and safety latch
- deformed or worn hooks for compliance with manufacturer's recommendations
- evidence of pitting or deterioration of electrical contacts
- interference with the free operation of buttons and controls
- damaged insulation on electrical wire, cables and controls
- inadequate performance or reliability of limit switch
- worn and/or damaged trolley and bridge wheel assemblies
- non-performance of load brake or controlled lowering device

- wear, cracks, or corrosion of wire rope, load chain, end clamps, or rope clips;
- missing or loose bolts in the supporting structure; and
- rope reeving (for compliance with crane manufacturer's specifications).

Overload Conditions

Cranes covered by the standard shall always be operated within the rated capacity. However, if at any time during operation, the equipment has been accidentally overloaded, the equipment shall be removed from service until an inspection can be performed (in accordance with the standard). Hazardous conditions disclosed by the inspection shall be corrected by the owner or employer of the equipment before the equipment is placed back in service.

Testing

Operational and running tests shall be performed prior to initial use for all new, reinstalled, modified or rebuilt equipment. The following functional items and components shall be tested: all motions; limit switches at full speed; limiting and indicating devices (if provided); all circuits, controls, interlocks, and sequence of operation; and each crane motion, holding brakes, and travel brakes, with the hook carrying:

- (a) rated capacity – during these tests the specified speeds are to be attained, provided the power supply to the crane is as specified; and
- (b) 125% of the rated capacity – during this test, the specified speeds need not be attained but the crane shall show itself capable of dealing with the load without difficulty. Prior to initial use, the vertical deflection of all new, reinstalled, modified, or rebuilt equipment shall be measured. The vertical deflection of the girder produced by the weight of the trolley and the rated load shall not exceed the maximum allowed by the applicable design specification. The rated capacity and 125% of the rated capacity tests must be performed with the crane or hoist installed on its supporting members (runway or monorail).

A test report shall be prepared, including test results and readings, and kept in the log book.

Maintenance

All repairs shall be performed by, or under the supervision of, a person having a minimum 8,000 hours of experience related to the repair of equipment as defined in Clause 1.1 of the standard. Preventive maintenance, repairs and adjustments shall be established, based on the specification and operating requirements of the crane. Dated and signed records shall be kept readily available. Replacement parts shall meet or exceed the original manufacturer's specifications. All welding shall conform to the requirements of CSA Standard W59.

Maintenance Procedures

Initial procedures: before adjustments and repairs are started on a crane, the following procedures shall be taken:

- (a) All motion controllers shall be placed in the off position. Main switch (crane disconnect) shall be operated in the open position, checked and de-energized, locked out, and tagged.
- (b) Before performing maintenance on the crane power-collector system, or any other crane component within the area of the building-power distribution system to the crane, the power source shall be de-energized, locked-out, and tagged. Where it is not practical to disconnect and lock-out the power supply to live electrical installation, equipment, or power lines, the power distributing system shall be guarded to prevent contact (according to the applicable legislation).
- (c) Personal protective equipment appropriate for the job hazards shall be worn.
- (d) Consideration shall be given to the power distribution system when mobile lifting equipment is used to access the crane from floor elevation. Mobile cranes, tools and other equipment which are capable of conducting electricity and endangering the safety of workers, shall not be used in proximity to any live electrical installation or equipment with which they might make electrical contact.

Safety barriers – markings and barriers shall be utilized in instances where maintenance work creates a hazardous area on the floor beneath the crane.

Isolation from other cranes – where other cranes are in operation on the same runway, rail stops or other means shall be provided to prevent interference with the crane being maintained.

Restricting runways – when work is being carried out on a crane in one of two adjacent crane runways, and the runways are not separated or protected, access to the adjacent runway shall be restricted.

Final procedures – after adjustments and repairs have been made, the crane shall not be restored to service until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed.

This bulletin contains a summary of excerpts taken from the Standard, for general information purposes only. This bulletin is not reflective of the complete requirements that the Standard prescribes.

Note: *Manitoba Regulation M.R. 217/2006 Section 1.4 inconsistency:*

If there is inconsistency between this regulation and a requirement contained in a publication, code or standard referenced in this regulation, the provisions in this regulation prevail.

Last reviewed/revised: December 2017