



RP 2.0: INSPECTION AND CERTIFICATION OF OVERHEAD EQUIPMENT

A Recommended Practice (RP) for the
Canadian Land-Based Drilling Industry

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Introduction

The Canadian Association of Oilwell Drilling Contractors (CAODC) Engineering & Technical (E&T) Committee has developed a Recommended Practice (RP) for the inspection and certification of overhead equipment (DR). This document dated December 2019 supersedes all prior editions of this Recommended Practice.

The information contained herein is a recommendation only of certification schedules for overhead equipment currently utilized in the Canadian drilling industry. An attempt has been made to establish some practical recommended operating practices for overhead equipment in the Canadian drilling industry.

The recommendations contained in this document should be considered in conjunction with the requirements of the original equipment manufacturers (OEM). Companies should operate and maintain the equipment within the operating limitations, such as load ratings, as designed by the OEM.

If the OEM stipulates increased levels of inspection or accelerated inspection/certification cycles, the contractors must follow the OEM guidelines unless granted approval to follow this CAODC Recommended Practice by a Professional Engineer.

CAODC has produced this Recommended Practice based on industry experience. However, this document should be considered in conjunction with all relevant legislation and the requirements of provincial regulatory authorities. This document should not be construed as a legal opinion, and users are advised to seek legal counsel to address their specific facts and circumstances.

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Range of Obligation

Throughout this RP the terms ‘must’, ‘shall’, ‘should’, ‘may’, and ‘can’ are used as indicated below:

Term	Usage
MUST	A specific or general regulatory and/or legal requirement that must be followed.
SHALL	An accepted industry practice or provision that the reader is obliged to satisfy to comply with this RP.
SHOULD	A recommendation or action that is advised.
MAY	An option or action that is permissible within the limits of the RP.
CAN	Possibility or capability.

Review Process

CAODC Recommended Practices are reviewed and revised, reaffirmed, or withdrawn at least every three years. A one-time extension of up to two years may be added to this review cycle. Email any comments or items of concern to rpfeedback@caodc.ca.

RP Revision Schedule

Revision Date	Revision Details
Edition 1	Sanctioned, 1994
Edition 2	Revised, 2001
Edition 3	Revised, August 2012
Edition 4	Revised, October 2013
	– (Section 4(b)(c)) reference to sheave maintenance revised
Edition 5	Revised, April 2015
	– (Section 2.5.1.1) One-Time Extension Provision revised to encompass blocks, top drives and crown assemblies
	– (Section 4.2) Provision to allow major repairs in field, revised
Edition 6	Revised, October 2016
	– Content standardized and reformatted for alignment
Edition 7	Revised, December 2019 - 1000 Day Inspection Extension Change - Addition of Crowns, Deadline Anchors, and Trolley beams

1. Scope

- 1.1** This recommended practice (RP) describes the inspection and certification schedule for overhead equipment currently utilized in the Canadian drilling industry, and is intended to ensure the safe and reliable operation of rig equipment.
- 1.2** For the purposes of this RP, overhead equipment on a drilling rig includes but is not limited to:
- a) Bails or links;
 - b) Coil tubing injectors;
 - c) Crown assemblies;
 - d) Elevators;
 - e) Hook;
 - f) Load path items on top drives;
 - g) Mechanical pipe racking system supported by the mast;
 - h) Power swivel;
 - i) Overhead Trolley Beams & Utility Winches;
 - j) Deadline Anchors;
 - k) Traveling block;
 - l) Torque guide dolleys (torque tubes, C-frames, torque restraint accessories).

2. Inspection Types

To ensure that overhead equipment is properly maintained and serviceable, four levels of inspection are recommended. At the time of scheduling inspection work, it is advised that the OEM agent or certifying Professional Engineer is contacted to ensure any related Safety or Product Bulletins are included in the scope of work:

2.1 Level I Inspection

2.1.1 A Level I inspection is a visual observation of the overhead equipment prior to, and/or during normal operation, and/or during routine maintenance.

2.1.2 Level I Inspection Personnel

Level I inspections are to be performed by Operating Personnel, as described in Section 6.1.2, and should also be included as part of the daily rig walk around carried out by the Driller or Rig Manager.

2.1.3 Level I Inspection Documentation

Level I inspections shall be recorded in the tour sheet.

2.2 Level II Inspection

2.2.1 A Level II inspection is a Level I inspection that includes a more thorough inspection of the load bearing components including crown and block sheaves that involves checking for:

- a) Proper lubrication;
- b) Obvious external cracks;
- c) Damage and/or premature wear or deterioration;
- d) Missing parts or guards.

2.2.2 Utility sheaves should be thoroughly checked for:

- a) Excessive wear, damage or cracking;
- b) Proper line size, and lubrication;
- c) Unrestricted rotation.

2.2.3 Sheave and wire rope retention shall be included in the inspection of all sheave applications.

2.2.4 Level II Inspection Personnel

Level II inspections should be carried out by the Driller or Rig Manager.

2.2.5 Level II Inspection Documentation

Level II inspections shall be recorded in the tour sheet.

2.3 Level III Inspection

2.3.1 Upon reaching the required number of operating days, as outlined in Section 3 - Inspection Frequency, a thorough visual inspection of the following critical components is required to determine the condition of the overhead equipment:

- a) All load bearing components;
- b) All structural and non-structural welds;
- c) All lifting and load bearing attachment points;
- d) Pins, wear tolerances, etc.

2.3.2 A Level III inspection requires rig equipment to be cleaned and inspected in the field to determine serviceability and may include or require:

- a) Non-destructive testing (NDT) techniques on critical areas, and load bearing components;
- b) Some disassembly as required;
- c) Outside technical assistance.

2.3.3 All repairs required shall be done in accordance with Section 5 – Repairs, Maintenance and Documentation.

2.3.4 Level III Inspection Personnel

Personnel qualified to perform and sign-off a Level III inspection include Inspection Personnel, as described in Section 6.1.1.

NOTE: There is no separately designated Operations or P.Eng Level III requirements for Overhead Equipment covered in this RP.

2.3.5 Level III Inspection Documentation

Level III inspections must be documented in the CAODC Mast and Overhead Equipment Log Book, or suitable equivalent.

2.4 Level IV Inspection and Certification

2.4.1 A Level IV inspection requires the equipment outlined in the Scope of this RP to be disassembled as required to do a complete inspection and may, at the certifying party's discretion, include NDT of all critical load bearing components.

2.4.2 For the purposes of this RP, the crown assembly, regardless if it is welded or pinned, is considered to be everything above the water table, including but not limited to the structure, crown cluster, fastline, deadline sheaves and utility sheaves (tuggers & snatchblocks).

2.4.3 At a minimum, the following process is recommended for completing crown and block sheave inspections:

- a) Sheaves must be removed from the shafts, cleaned, and dimensionally inspected;
- b) Bearing races may be removed at the certifying party's discretion;
- c) Sheave surface must be prepared as required for suitable NDT inspection;
- d) Sheaves must be gauged using a sheave gauge;
- e) Tread thickness shall be evaluated, documented and approved by a Professional Engineer;
- f) Wall thickness shall be evaluated, documented and approved by a Professional Engineer;
- g) Depth of groove, proper groove sizing shall be evaluated, documented and approved by a Professional Engineer;
- h) An NDT inspection of all structural, sheaves, shafts, pedestals, and guards must be performed.

2.4.4 Overhead Trolley Beams and Utility Winches

In reference to CAODC T-19-01 - Overhead trolley beams, and utility winches operating on rig equipment and in support buildings (doghouses, mudtanks, drawworks, substructures, pumphouses, etc.) are not considered cranes as they are engineered for fit-for-purpose applications related to maintenance and function of oilfield equipment.

Regardless of the system complexity, all systems designed for overhead use must have ratings designated by the Original Equipment Manufacturer (OEM) or a Professional Engineer. Additionally, the following standards must be adhered to:

- a) Working within the lowest rated Safe Working Load (SWL) component in the system;
- b) Ratings must be visible;
- c) Pre-use visual inspection (including good rigging and slinging practices).

2.4.5 All rigging and slinging related to overhead equipment must be approved by the responsible party prior to use.

2.4.6 It is the responsibility of the owner to ensure all systems designed for Overhead applications have ratings designated by the Original Equipment Manufacturer (OEM), or a Professional Engineer. The equipment shall have ratings clearly visible, and documented along with operating within the lowest Safe working Load (SWL) component in the assembly.

2.4.7 Inspection requirements will be at the discretion of the certifying party.

2.4.8 All repairs required should be done in accordance with Section 5 – Repairs, Maintenance and Documentation.

2.4.9 Level IV Inspection and Certification Personnel

Personnel qualified to perform and sign-off on a Level IV inspection include Professional Engineers, as described in Section 6.1.4, or OEM Agents, as described in Section 6.1.6.

2.4.10 Level IV Inspection and Certification Documentation

A certification document(s) will be provided by the certifying party and should include the following:

- a) Document author;
- b) Date and period of certification;
- c) Overhead equipment serial number (if available);
- d) Name of manufacturer (if available);

- e) Date of manufacture (if available);
- f) Capacity rating (daN) and/or (lbs);
- g) Results of the Level IV inspection;
- h) Location of repairs (if applicable);

2.4.11 Level IV inspections must be documented in the CAODC Mast and Overhead Equipment Log Book, or suitable equivalent, and signed by the certifying party.

3. Inspection Frequency

At a minimum, the inspection frequency of overhead equipment shall be conducted in accordance with the schedule below:

Equipment	Documentation	Daily	Weekly	250 Days	500 Days	750 Days	1000 Days	1250 Days
Bails or links	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Coiled tubing injectors	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Crown assemblies	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Elevators	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	IV	III	IV	
Hook*	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Deadline Anchor	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Load path on top drives	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Mechanical pipe racking system	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	IV	III	IV	
Power swivel	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Trolley beams & utility winches	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Travelling block**	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV
Torque guided dolleys	Tour Sheet	I	II					
	Mast and Overhead Equipment Logbook			III	III	III	III	IV

3.1 * A complete Level IV inspection must be conducted on Web Wilson Hooks every six (6) months as recommended by the OEM. For more information, refer to CAODC Technical Information Bulletins T-89-4 and T-91-2.

** A complete Level IV inspection must be conducted on McKissick blocks every five (5) years as recommended by the OEM.

3.2 Should circumstances arise where OEM recommendations or individual experience dictate otherwise, CAODC member companies may conduct these inspections at greater frequencies.

3.3 One operating day = 24 accumulated operating hours from spud to rig release.

4. Load Derating

4.1 Load derating of used equipment, such as links (bails), will be either by an acceptable OEM's chart or by the opinion of a Professional Engineer.

4.2 Items that are derated must have identifiable markings showing the new rating and reflect the words "LOAD DERATED".

5. Repairs, Maintenance and Documentation

5.1 Occasionally repairs and/or maintenance following a Level III or IV inspection may be required to retain the operating integrity of overhead equipment.

5.2 Any damage that requires repair will be categorized as minor or major.

5.3 If there is any question as to whether the damage is minor or major, a Professional Engineer, as described in Section 6.1.4, or an OEM Agent, as described in Section 6.1.6, must be consulted.

5.4 Minor damage is considered damage or distortion to equipment and includes:

- a) Guards;
- b) Non-loaded attachments;
- c) Cosmetic repairs to sheaves and API connections (threaded on swivels), etc.

5.4.1 Minor Damage Repair Personnel

Minor repairs may be completed by Operating Personnel, as described in Section 6.1.2, at the discretion of the Rig Manager or higher authority, and do not require repair certification.

5.4.2 Major damage is considered geometrical distortion or structural damage and includes:

- a) All weld repairs to any load bearing component;
- b) Any modification to load bearing equipment such as:
 - i. Oversizing or under sizing pin fits, and
 - ii. Sheave regrooving;
- c) Any replacement of load bearing pieces such as:
 - i. Hook shanks;
 - ii. Axles;
 - iii. Pins, etc.
- d) Repairs to the crown that are not cosmetic (i.e. replacement or repair of members).

5.4.3 All major damage must be repaired and upon completion requires NDT inspection and documentation in the form of a repair certification.

5.4.4 Repairs may be completed in a field environment provided they can be performed adequately and are accessible for NDT inspection.

5.4.5 All major repairs shall be completed with the assistance of a Professional Engineer, as described in Section 6.1.4, or an OEM Agent approved procedure. The certifying party would supply the repair facility with a repair procedure and provide notes on the repair certification.

5.4.6 Major Damage Repair Personnel

Personnel qualified to instruct, oversee and certify major repairs include Professional Engineers, as described in Section 6.1.4, or OEM Agents, as described in Section 6.1.6.

5.5 Repair and Maintenance Documentation

5.5.1 All repairs and maintenance performed shall be documented in the CAODC Mast and Overhead Equipment Log Book, or suitable equivalent, and include the following information:

- a) Date repairs and/or maintenance was conducted;
- b) Description of repairs and/or maintenance that was completed;

- c) For minor repairs, the Operating Personnel, as described in Section 6.1.2, that completed the repair and/or maintenance;
- d) For major repairs, the certifying party of the repair.

5.5.2 All components, where practical, should have serial numbers or unique identifiers stamped on them to verify the documentation.

5.5.3 Major Repair Documentation (Recertification)

- a) The certifying party should supply the repairing party with a certification document for the equipment requiring major repairs;
- b) Repair certifications are intended to maintain Level IV certification and do not extend the Level IV certification requirements unless a complete Level IV inspection is conducted.

6. Personnel Qualifications, Training and Documentation

6.1 Personnel Qualifications

It is the responsibility of equipment owners to ensure that individuals involved in the inspection, repair, and certification of substructures are properly qualified, trained, and competent in their respective roles through documented education, training or experience as outlined in Section 6.2. Role specific requirements are listed below.

6.1.1 Inspection Personnel

Typical Inspection Personnel are considered to be individuals designated by the company that have:

- a) Knowledge of working principles of the equipment referenced in this RP;
- b) Mechanical competency in the disassembly of the equipment type and model; and
- c) Experience and knowledge in drilling rig maintenance.

Examples of Inspection Personnel include: Professional Engineers, OEM Agents, Mechanical and/or Maintenance Managers and senior operations personnel such as Rig Managers, Field Superintendents, Technologists, Rig-up Superintendents, Shop Foremen, and Operations Managers.

6.1.2 Operating Personnel

Typical Operating Personnel are considered to be members of the rig crew that have:

- a) Knowledge of working principles of the equipment referenced in this RP; and
- b) Experience and knowledge in drilling rig maintenance.

6.1.3 NDT Technicians

At a minimum, NDT Technicians are required to have Level II, Canadian Government Standards Board (CGSB) certification or other approved certification/training at the discretion of the certifying party.

6.1.4 Professional Engineers

Professional Engineer's shall have:

- a) Previous experience and training in structural and/or mechanical analysis;
- b) A practical working knowledge of equipment referenced in this RP;
- c) Previous experience and training in the repair of the equipment referenced in this RP;
- d) Experience with general quality control standards; and
- e) Professional status in Canada.

6.1.5 Original Equipment Manufacturers (OEM)

The company who built the original piece of equipment under inspection.

6.1.6 Original Equipment Manufacturer Agent

A designate of the OEM that has a practical working knowledge of the specific equipment under inspection.

6.1.7 Welders

Welders must hold a valid Journeyman Welder certificate and have experience in drilling rig maintenance.

6.2 Personnel Training

- ### **6.2.1**
- To satisfy provincial regulations and ensure that equipment will operate in the manner for which it was designed, [Inspection](#) and [Operating Personnel](#) shall be adequately trained to conduct inspections (including visual) in accordance with this Recommended Practice.

In reference to CAODC Technical Information Bulletin T-19-05, the operating frequencies within this RP are approved based on several

conditions including but not limited to improvements and focus on the Level III inspections, competencies, documentation, and training.

- 6.2.2** At a minimum, owner companies must arrange Level III training for personnel outlined in Section 6.1.1 with the content of this RP, and the CAODC Level III/IV Mast Inspection Summary Form and Checklist. Training sessions shall be performed by a Professional Engineer once every 5 years for each person designated by the company to perform this work.

6.3 Personnel Documentation

Companies shall have a process in place that documents and retains all training administered to company designated personnel referenced in this Recommended Practice and must include the following.

- Date of training
- Location of training
- Names and signatures of attendees
- Names and signatures of Professional Engineer(s) instructing the training session