RP 2.0: INSPECTION AND CERTIFICATION OF OVERHEAD EQUIPMENT

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

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CANADIAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS

RECOMMENDED PRACTICE 2.0

INSPECTION AND CERTIFICATION OF OVERHEAD EQUIPMENT (DR)

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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 overhead equipment. This document dated October 2016 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 (P. Eng).

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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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CAODC Recommended Practices are reviewed and revised, reaffirmed, or withdrawn at least every three years.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
October 2013	Section 4 (b) Sheaves: previous wording *"Bearing races must be removed"* revised to: "*Bearing races may be removed at the certifying engineer's discretion*".
	Section 4(c) Sheaves: previous wording "*Sheaves must be either sandblasted or acid dipped to remove all paint*" revised to "*Sheaves surface must be prepared as required for suitable NDT inspection*".
October 2014	Introduction revised to standardize all RP's.
October 2016	Content standardized for alignment and reformatted into new RP template.

1. SCOPE – OVERHEAD EQUIPMENT

The overhead equipment for drilling rigs covered in this RP is as follows:

- Traveling block;
- Hook;
- Swivel;
- Bails or links;
- Elevators;
- Load path items on top drives;
- Coil tubing injectors;
- Mechanical pipe racking system supported by the mast.

1.1 MASTS AND CROWNS

Refer to CAODC RP 1.0 Inspection and Certification of Masts.

1.2 SUBSTRUCTURES

Refer to CAODC RP 1.0A Inspection and Certification of Substructures.

2. INSPECTION TYPES

To ensure that equipment is properly maintained and serviceable, four levels of inspection are recommended:

2.1 LEVEL I INSPECTION

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

2.1.1 LEVEL I INSPECTION PERSONNEL

Level I inspections are to be performed by the rig crew.

2.1.2 LEVEL I INSPECTION DOCUMENTATION

Level I inspections shall be recorded in the tour sheet.

2.2 LEVEL II INSPECTION

A Level II inspection is a Level I inspection that includes a more thorough inspection of, but not limited to, load bearing components that includes checking for:

- Proper lubrication;
- Obvious external cracks;
- Damage and/or premature wear or deterioration;
- Missing parts or guards.

2.2.1 LEVEL II INSPECTION PERSONNEL

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

2.2.2 LEVEL II INSPECTION DOCUMENTATION

Level II inspections shall be recorded in the tour sheet.

2.3 LEVEL III INSPECTION

A Level III inspection requires rig equipment to be thoroughly checked in the field to determine serviceability. This may include Non Destructive Testing (NDT) techniques on load bearing components, and may require some minor disassembly of guards.

Note: *Level III inspections for masts require outside technical assistance.*

Upon reaching the required number of operating days, as outlined in Section 3 - Inspection Frequency, overhead equipment shall be Level III inspected. At a minimum, a thorough visual inspection of the following critical components is required to determine the condition of the equipment:

- All load bearing components;
- Pickup points;
- Pins;
- Wear tolerances.

Any repairs required will be done as described in Section 5 – Repairs, Maintenance and Documentation.

2.3.1 LEVEL III INSPECTION PERSONNEL

Personnel qualified to supervise and/or provide technical assistance for Level III inspections include:

- Inspection Personnel as described in Section 6.1.1.

- NDT Technicians as described in Section 6.1.3;
- Professional Engineer's as described in Section 6.1.4.

2.3.2 LEVEL III INSPECTION DOCUMENTATION

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

2.4 LEVEL IV INSPECTION AND CERTIFICATION

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

Any repairs required will be done as described in Section 5 – Repairs, Maintenance and Documentation.

2.4.1 SHEAVES

As part of each Level IV block certification, the sheave cluster must be completely disassembled and the sheaves and shaft inspected. This procedure shall include the following:

- Sheaves must be:
  - Removed from the travelling block shaft;
  - Gauged using a sheave gauge;
  - Measured for tread thickness, depth of groove and proper groove sizing;
  - Measured for wall thickness (thinnest wall under the 150 degree arc that defines the tread);
- Sheaves surface must be prepared as required for suitable NDT inspection;
- Bearing races may be removed at the certifying party's discretion;
- Depth of groove, proper groove sizing;
- An NDT inspection for cracks must be performed.

2.4.2 MAST EXTENSION PROVISION

In conjunction with RP 1.0 – Inspection and Certification of Masts, Section 2.5.1.1, if an extension is granted to the mast, it will also apply to the blocks, top drive and crown assembly providing the following conditions are met:

- The blocks, top drive and crown assembly are in use and on a mast that requires a one-time extension;
- Extension to overhead equipment only applies when an extension has been granted to the mast, and is only valid for the duration of that extension;
- Extensions shall not be granted to any overhead equipment if an extension to the mast is not required;
- Extension is granted prior to the 1000th operating day; and
- A Professional Engineer (as described in Section 6.1.4) performs a complete visual inspection.

Note: *a well spudded prior to the expiry of the original 1000 operating days may be completed.*

2.4.3 LEVEL IV INSPECTION AND CERTIFICATION PERSONNEL

Personnel qualified to perform a Level IV inspection typically include:

- NDT Technicians as described in Section 6.1.3;
- Professional Engineer's as described in Section 6.1.4;

2.4.4 LEVEL IV INSPECTION AND CERTIFICATION DOCUMENTATION

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

- Document author;
- Date and period of certification;
- Overhead equipment serial number (if available);
- Name of manufacturer (if available);
- Date of manufacture (if available);

- Results of the Level IV inspection;
- Location of repairs (if applicable).

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

Sample - Overhead Equipment Certification

for

ABC DRILLING COMPANY

RIG 1

Travelling Hook/Block

Date: March 1, 2012

The Hook Block Ratings are as follows:

Manufacturer: XXX Manufacturing

Serial No: XX-XXX

Rating: XXX,XXX lbs / XXX,XXX daN

The following items were inspected prior to reassembly:

1 Hook Body	7 Quill
2 Spacer Block	8 Keeper
3 Side Plates (2x)	9 Nut
4 Main Latch	10 Pins
5 Cap	11 Sheaves (4x)
6 Springs	12 Main Shaft

During February 2012 the ABC Drilling Rig 1 hook block was refurbished in ABC's yard in Nisku, Alberta. Repairs to defects as identified by XYZ Engineering's P.Eng and MPI Company (file no. xxxx) were repaired by the ABC Mechanical Staff and DEF Machine Shop. The Sheaves were disassembled by ABC replacing all of the bearings with new ones.

Based on these repairs and inspections, it is my opinion that the Hook Block is safe to operate within its rated capacity when used in accordance with manufacturers specifications and/or industry standards provided that the owner performs routine inspections as/per the CAODC RP2.0 Guidelines. This certification is valid for **1000 Operating Days** or until such time that the Hook Block is damaged by operations, handling, or transportation.

XYZ Engineering Ltd.

Engineer's Stamp with Appropriate Jurisdiction

John Smith, P.Eng
123 Avenue Street
Edmonton, Alberta, XXX-XXX
Phone: (XXX) XXX-XXXX
Fax: (XXX) XXX-XXXX
File No: XXXX

Permit to Practice Stamp or Permit Number

3. INSPECTION FREQUENCY

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

Note: *should circumstances, OEM recommendations or individual experience dictate otherwise, CAODC member companies may conduct these inspections at greater frequencies.*

EQUIPMENT	DAILY	WEEKLY	250 DAYS	500 DAYS	750 DAYS	1000 DAYS
Block	I	II	III	III	III	IV
Hook*	I	II	III	III	III	IV
Swivel	I	II	III	III	III	IV
Bails	I	II	III	III	III	IV
Elevators	I	II	III	IV	III	IV
Load path items on top drives	I	II	III	III	III	IV
Coiled tubing injectors	I	II	III	III	III	IV
Mechanical racking systems	I	II	III	IV	III	IV

***** 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 (attached).

Note: *one operating day = 24 accumulated operating hours from spud to rig release.*

4. LOAD DERATING

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

5. REPAIRS, MAINTENANCE AND DOCUMENTATION

Occasionally repairs and/or maintenance following a Level III or IV inspection may be required to retain the operating integrity of overhead equipment. Any damage that requires repair will be categorized as minor or major as follows:

5.1 MINOR DAMAGE

Minor damage includes the repair of:

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

5.1.1 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 re-inspection.

If there is any question as to whether the damage is minor or major, one of the following must be consulted:

- Professional Engineer as described in Section 6.1.4; or
- OEM Agent as described in Section 6.1.6.

5.2 MAJOR DAMAGE

Major damage includes:

- All weld repairs to any load bearing component;
- Any modification to load bearing equipment such as:
  - Oversizing or undersizing pin fits, and
  - Sheave regrooving;
- Any replacement of load bearing pieces such as:
  - Hook shanks;
  - Axles;
  - Pins, etc.

All major damage must be repaired and upon completion, requires a Level IV inspection specific to the equipment that was repaired. Repairs may be completed in a field environment provided they can be performed adequately and are accessible for NDT inspection.

Note: *all major repairs shall be done following a Professional Engineer or OEM Agent procedure. The certifying party would supply the repair facility with an engineering procedure and so note on the repair documentation.*

5.3 REPAIR AND MAINTENANCE DOCUMENTATION

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

- Date repairs and/or maintenance was conducted;
- Description of repairs and/or maintenance that was completed;
- For minor repairs:
  - Operating Personnel (as described in Section 6.1.2) that performed the repair and/or maintenance;
- For major repairs:
  - Certifying party who performed the repair, including signature.

Note: *all components, where practical, should have serial numbers or unique identifiers stamped on them to verify the documentation.*

5.3.1 MAJOR REPAIR DOCUMENTATION (RECERTIFICATION)

The certifying party will provide a certification document for the equipment requiring major repairs.

Any repair certification issued is for the repair of actual damage and is intended to maintain Level IV certification. It does not extend the Level IV certification requirements unless a complete Level IV inspection is conducted in accordance with Section 2.4 - Level IV Inspection and Certification.

6. PERSONNEL QUALIFICATION, TRAINING AND DOCUMENTATION

6.1 PERSONNEL QUALIFICATIONS

6.1.1 INSPECTION PERSONNEL

Typical Inspection Personnel are considered to be senior operations personnel designated by the company that have:

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

Examples of senior operations personnel include: 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:

- Knowledge of working principles of the equipment referenced in this RP;
- 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 at the discretion of the owner/inspector.

6.1.4 PROFESSIONAL ENGINEERS

Professional Engineer's shall have:

- Previous experience and training in structural and/or mechanical analysis;
- A practical working knowledge of equipment referenced in this RP;
- Previous experience and training in the repair of the equipment referenced in this RP;

- Experience with general quality control standards;
- 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 Journeyman Welder certificate and have experience in drilling rig maintenance.

6.2 PERSONNEL TRAINING

To satisfy provincial regulations and ensure that equipment will operate in the manner for which it was designed, Inspection and Operating Personnel (as described in Section 6 - Personnel Qualification, Training and Documentation) shall be adequately trained to conduct inspections (including visual) in accordance with this Recommended Practice. At a minimum, training should outline the inspection criteria for all critical components outlined in this Recommended Practice.

6.3 PERSONNEL DOCUMENTATION

Companies shall have a process in place that documents and retains all training administered to company personnel referenced in this Recommended Practice and should include:

- Date training took place;
- Who was in attendance.

CANADIAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS
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Telephone (403)264-4311 Facsimile (403)263-3796
email info@caodc.ca

TECHNICAL INFORMATION BULLETIN

T-89-4

(To All Land-Based Drilling and Service Rig Representatives)

August 1, 1989

Subject: **Warning Alert - Web Wilson Hooks**

Attached are two product warnings respecting Web Wilson Hooks, issued by the manufacturer – Cooper Industries.

The Bulletins – Number 0004 and 0014 – refer to the results of atmospheric conditions on hook block combinations, causing corrosion that could lead to hook shank failures. The second bulletin relates to shank failures where the shanks were not manufactured by Joy Petroleum or Cooper Industries.

The Martin-Decker sales office in Calgary is at:

#1100, 333 - 11 Avenue S.W.
Fax: 403-266-2465 Tel: 403-262-4655
Mike Conner – Canada Regional Sales Manger

For further information, please contact the office noted above.

Don M. Herring
Managing Director

DMH/als-GEN6

Att.

RETAIN FOR FUTURE REFERENCE

MARTIN-DECKER PRODUCT CHANGE *Alert*

SUBJECT: WEB WILSON HOOKS

BULLETIN NUMBER: 0004

DATE: June 26, 1989

TO: Distribution

FROM: Greg Hottle

PRODUCT WARNING

==========

Hooks and hook block combinations are generally used and stored in unprotected areas and are subject to atmospheric conditions conducive to corrosion attack. Because of this, it is necessary for Martin Decker to remind customers that corrosion fatigue can possibly cause hook shank failures, which can in turn lead to serious bodily injury or property damage.

It is therefore very important that the shank, split rings, top cover and gasket receive special attention during regular field inspection and maintenance.

The Web Wilson Hydra Hook booklet "Ordering, Operating and Maintenance Instructions" advises to check these components for corrosion pitting or presence of cracks at six month intervals.

Martin-Decker requests that all users consider this six month interval a mandatory inspection and that the following points be rigidly enforced.

1. Inspect hook shanks for cracks using either wet magnetic particle inspection procedures or liquid dye penetrant. When using magnetic particle, the shank should be magnetized by employing coils only and not by using prods. Electrical arcs, at points where "prods" contact the metal, as well as pitting from corrosion, may produce stress riser points that can cause ultimate failure of the part. If there are any crack indications, the shank and split rings should be replaced with original Martin-Decker manufactured parts.

2. In addition to crack detection above, the shank should be examined for evidence of corrosion pitting or galling, which can also require replacement of the split rings and shank. If the shank is pitted or galled, the user should contact his Martin-Decker representative for instructions.

3. Never replace split rings or shank without replacing both.

4. Lubricate split rings, shank head and top cavity with a good quality EP grease.

5. Always replace the gasket and ensure that cover and bolts are properly tightened.

If you do not have a copy of Web Wilson Hydra Hook "Ordering, Operating and Maintenance Instructions", contact your nearest Martin-Decker office.

Bulletin Number 681 provides information for 40, 65, 100, 150, 250 and 350 Ton Hydra Hooks.

Bulletin Number 1181 covers the 500 Ton Return-A-Matic Hook.

Please ensure this notice is distributed to all of your operating locations.

A DIVISION OF COOPER INDUSTRIES, 1200 CYPRESS CREEK ROAD, P.O. BOX 1179, CEDAR PARK, TX 78613 U.S.A. TEL. (512) 331-0411 TELEX 4996710

MARTIN-DECKER PRODUCT CHANGE Alert

SUBJECT: WEB WILSON HOOKS

BULLETIN NUMBER: 0014

DATE: June 26, 1989

TO: Distribution

FROM: Greg Hottle

PRODUCT WARNING

==========

There have been some shank failures in Web Wilson brand hooks where the shanks were not manufactured by an authorized manufacturing facility of Joy Petroleum or Cooper Industries.

All authentic Web Wilson shanks have the serial numbers and part numbers stenciled on the end. If you suspect you might have a shank that was not manufactured by an authorized Joy Petroleum or Cooper Industries location, please contact your nearest Martin-Decker office for serial number verification.

Please ensure this notice is distributed to all of your operating locations.

A DIVISION OF COOPER INDUSTRIES, 1200 CYPRESS CREEK ROAD, P.O. BOX 1179, CEDAR PARK, TX 78613 U.S.A. TEL. (512) 331-0411 TELEX 4996710

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TECHNICAL INFORMATION BULLETIN

T-91-2

(All Land-Based Drilling and Service Rig Contractors)

January 25, 1991

Subject: **Webb Wilson Hooks**

In November, 1990, the shank on a Webb Wilson 100 ton hook parted, dropping the lower portion of the hook, the bails and elevator onto a floorhand, seriously injuring him. This is the most recent of several such incidents over the last two to three years. Members' attention is drawn to CAODC Technical Information Bulletin T-89-4, dated August 1, 1989. This bulletin outlines concerns with non-OEM shanks and the need to conduct regular NDT inspections of the hook. It should be noted that the shank in Webb Wilson hooks is now made from a forged casting and not from machined bar stock. This change, along with others, was made to correct earlier problems with the machined shank.

Members are advised to review the concerns outlined in CAODC Bulletin T-89-4. They are also advised of the need to carefully inspect the split retaining ring, the shank groove and the load-bearing shoulders of the hook body.

For further information on Webb Wilson hooks, contact Mr. Kevin Markiw of Varco BJ Oil Tools Ltd. at (403) 444-1285.

Colin B. Murch
Manager, Service Rig Division

CBM/eru-120.0

RETAIN FOR FUTURE REFERENCE