



RP 10.0: INSPECTION OF DRAWWORKS BRAKE LOAD PATH COMPONENTS

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

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RECOMMENDED PRACTICE 10.0
INSPECTION OF DRAWWORKS BRAKE LOAD PATH COMPONENTS (DR/SR)

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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 drawworks brake load path components.

The information contained herein is a recommendation only of inspection schedules for drawworks brake load path components currently utilized in the Canadian drilling and well servicing industry. An attempt has been made to establish some practical recommended operating practices for drawworks brake load path components in the Canadian drilling and well servicing 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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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CAODC Recommended Practices are reviewed and revised, reaffirmed, or withdrawn at least every three years.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.

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

RP REVISION SCHEDULE

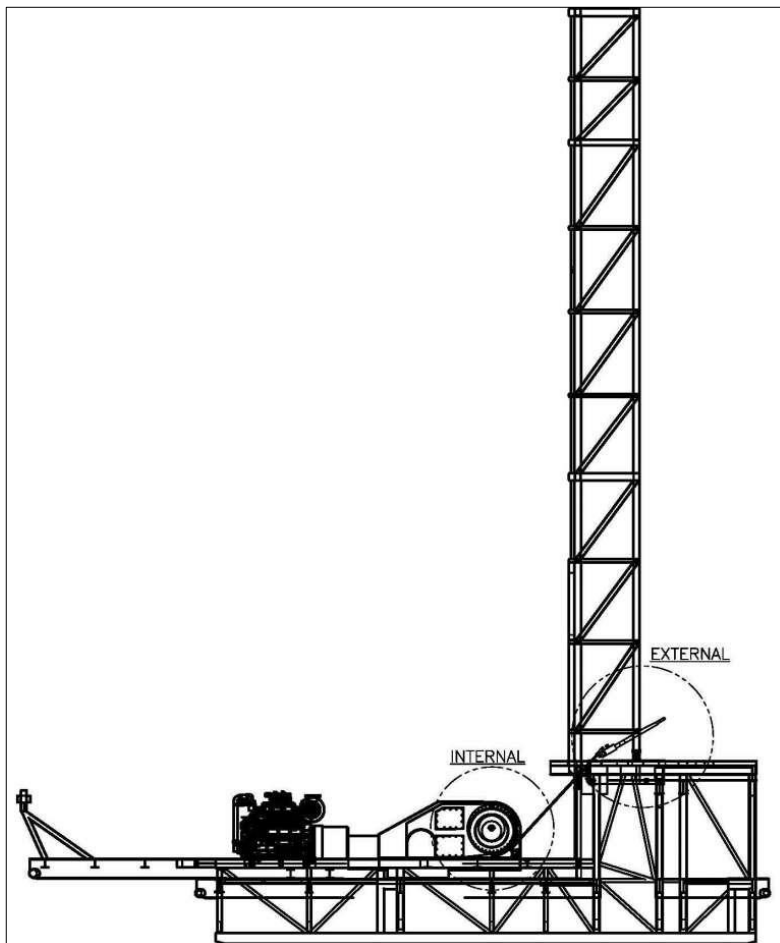
Revision Date	Revision Details
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1. SCOPE – DRAWWORKS BRAKE LOAD PATH COMPONENTS (DBLP)

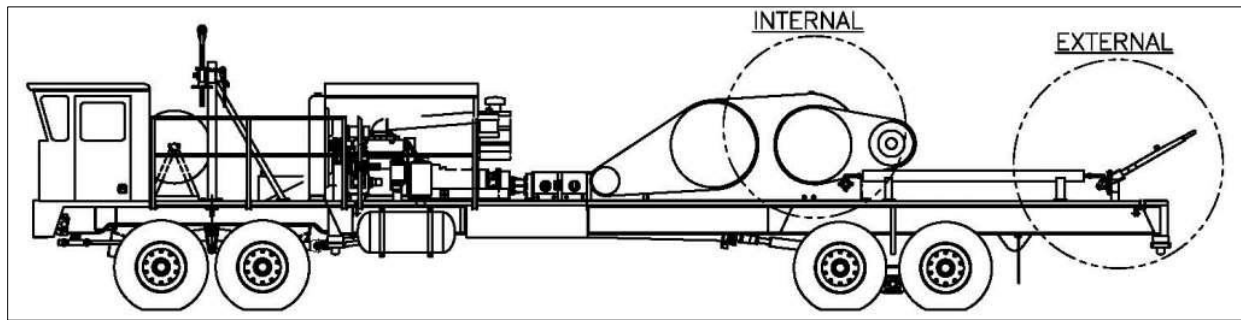
For the purposes of this RP, the drawworks brake load path is considered to be all mechanical components, including the brake handle and all brake linkages, of the mechanical brake towards the drawworks drum.

The DBLP components for drilling and/or service rigs covered in this Recommended Practice are as follows:

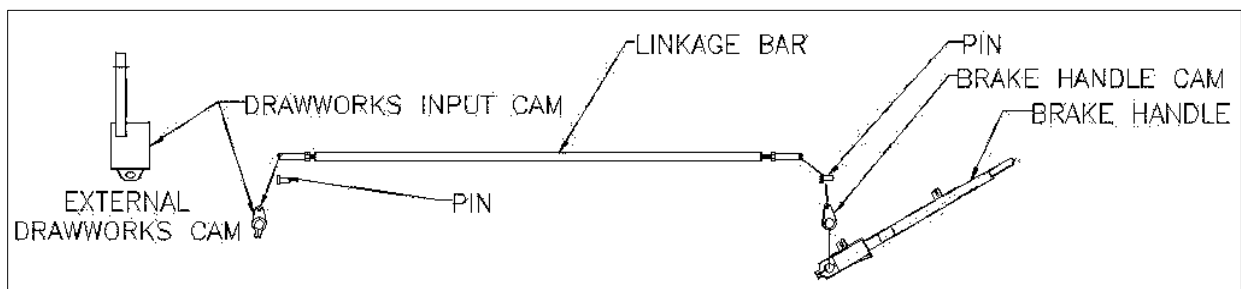
- Brake bands;
- Brake handle;
- Brake handle locking mechanism;
- Brake linkage components;
- Auxiliary brake (or equivalent);
- Any other load bearing mechanical brake.



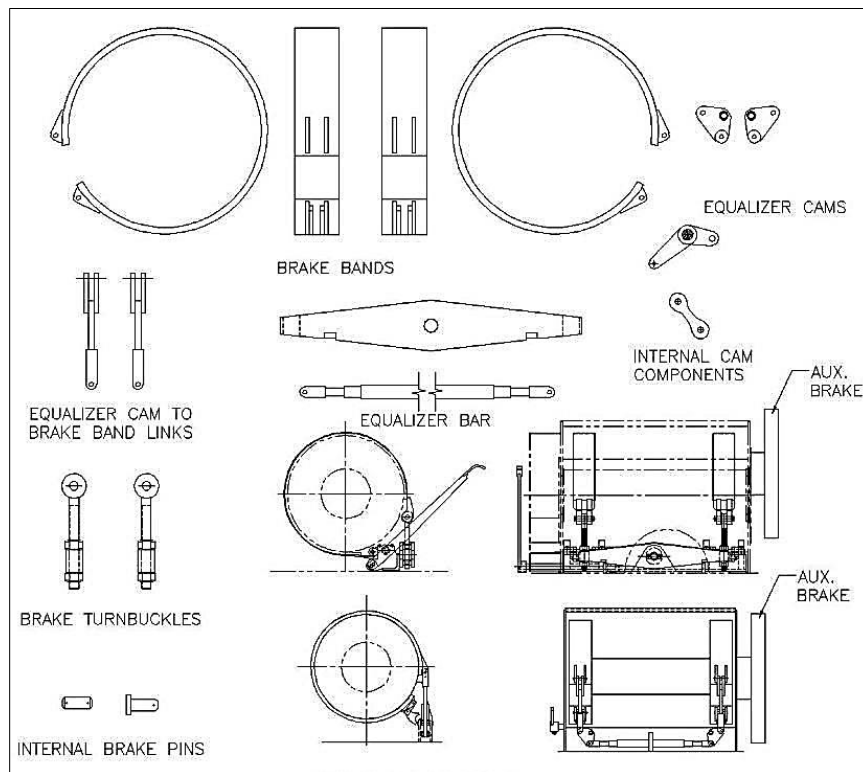
Location of DBLP
Components –
Drilling Rig



Location of DBLP Components - Service Rig



External Components – Main Drum Brake Linkage



Internal Components – Main Drum Brake Linkage

2. INSPECTION TYPES

To ensure DBLP components are properly maintained and serviceable, four levels of inspection are recommended.

2.1 LEVEL I INSPECTION

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

- All pinned connections to ensure cotter pins have been installed correctly and are a sufficient size;
- The welded linkage components;
- All keyed connections to ensure key ways are not worn;
- Brake handle securement device.

2.1.1 LEVEL I INSPECTION PERSONNEL

Level I inspections are performed by the rig crew and should also be included as part of the daily rig walk around carried out by the Driller or Rig Manager.

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 the equipment that includes checking for:

- Proper lubrication;
- Obvious external cracks (e.g. paint chips);
- Damage and/or premature wear or deterioration;
- Missing or damaged parts such as cotter pins, fasteners and guards;
- Distortion on mechanical parts;
- A 2-person review of moving mechanical parts (i.e. one person performs a visual review of the moving mechanical parts while the other function tests the brakes);

Note: *linkage movement should be watched to ensure rods are not cracked, broken or bent.*

2.2.1 LEVEL II INSPECTION PERSONNEL

Level II inspections should be performed 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, at the inspector's discretion, include Non Destructive Testing (NDT) techniques, and may require some minor disassembly of guards.

Any repairs required should be done as described in [Section 4 – Repairs, Maintenance and Documentation](#).

2.3.1 LEVEL III INSPECTION – SERVICE RIGS

Every calendar year from the date of a Level IV inspection, or previous Level III inspection, whichever occurred last, DBLP components shall be Level III inspected. At a minimum, the following procedure is required:

- A visual inspection of:
 - All brake linkage and brake assembly;
 - The brake linkage bar, ensuring removal of the guard to allow for proper inspection;
 - Brake linkage mounting points;
- A function test of the auxiliary braking system.

2.3.2 LEVEL III INSPECTION – DRILLING RIGS

Upon reaching the required number of operating days, as outlined in [Section 3 - Inspection Frequency](#), DBLP components shall be Level III inspected. At a minimum, the following procedure is required:

- A visual inspection of all brake linkage and brake assembly;
- A visual inspection of brake linkage mounting points;

- A function test of the auxiliary braking system.

2.3.3 LEVEL III INSPECTION PERSONNEL

Personnel qualified to perform a Level III inspection include:

- Inspection Personnel as described in [Section 5.1.1](#);
- OEM Agents as described in [Section 5.1.6](#).

2.3.4 LEVEL III INSPECTION DOCUMENTATION

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

2.4 LEVEL IV INSPECTION

A Level IV inspection requires the equipment to be disassembled as required to do a complete inspection. NDT of all critical areas are typically done in accordance with American Society for Testing and Materials (ASTM) E709, A903 standards, or equivalent.

Upon reaching the required number of operating days and/or hours, as outlined in [Section 3 - Inspection Frequency](#), DBLP components shall be Level IV inspected. The following is recommended for completing this inspection:

- Ensure all braking pin connections have cotter pins;
- NDT of brake linkages;
- NDT of brake bands;
- Brake band drum thickness check;
- NDT of equalizer bar and all associated components;
- Visual inspection of bearing and mounting of pillow blocks for damage;

2.4.1 ONE-TIME EXTENSION PROVISION

Prior to the 1000th operating day, a one-time extension of 100 operating days may be granted providing:

- Level III inspection is performed on the drawworks; and
- A Level IV inspection is performed on the brake bands.

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

2.4.2 LEVEL IV INSPECTION PERSONNEL

Personnel qualified to perform a Level IV inspection typically include:

- Inspection Personnel as described in [Section 5.1.1](#);
- OEM Agents as described in [Section 5.1.6](#).

2.4.3 LEVEL IV INSPECTION DOCUMENTATION

Documentation will be provided by the equipment owner or OEM (as described in [Section 5.1.5](#)) and should include the following information:

- Documentation author;
- Date of inspection;
- Drawworks serial number (if available);
- Name of manufacturer (if available);
- Date of manufacture (if available);
- Results of the Level IV inspection;
- Location and mapping of performed repairs on equipment (if applicable);
- Location of repair facility.

Additionally, Level IV inspections shall be documented in the CAODC Overhead Mast and Equipment Log Book, or suitable alternative, and signed by Inspection Personnel as outlined in [Section 5.1.1](#).

3. INSPECTION FREQUENCY

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

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

3.1 INSPECTION FREQUENCY – DRILLING RIGS

EQUIPMENT	DAILY	WEEKLY	250 DAYS	500 DAYS	750 DAYS	1000 DAYS
Brake bands	I	II	III	IV	III	IV
Brake handle	I	II	III	III	III	IV
Brake handle locking mechanism	I	II	III	III	III	IV
Brake linkage components	I	II	III	III	III	IV
Auxiliary brake (or equivalent)	I	II	III	III	III	III
Any other load bearing mechanical brake	I	II	III	III	III	IV

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

3.2 INSPECTION FREQUENCY – SERVICE RIGS

EQUIPMENT	DAILY	WEEKLY	ANNUAL	24,000 OP* HOURS
Brake bands	I	II	III	IV
Brake handle	I	II	III	IV
Brake handle locking mechanism	I	II	III	IV
Brake linkage components	I	II	III	IV
Auxiliary brake (or equivalent)	I	II	III	III
Any other load bearing mechanical brake	I	II	III	IV

*OP = operating

4. **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 the equipment. Any damage that requires repair will be categorized as minor or major as follows:

4.1 **MINOR DAMAGE**

Minor damage includes the following:

- Chasing threads;
- Setting of brakes;
- Repair of guards;
- Replacement of:
 - Worn pins in linkage assembly;
 - Parts such as linkage bars;
 - Drive shafts;
 - Brake band pads;
 - Auxiliary brake pads;
 - Pillow block bearings on linkage.

4.1.1 **MINOR DAMAGE REPAIR PERSONNEL**

Minor repairs may be completed by Operating Personnel as described in [Section 5.1.2](#) at the discretion of the Rig Manager or higher authority, and do not require re-inspection.

If there is any question whether the damage is minor or major, either a Professional Engineer or the OEM as described in [Section 5.1 - Personnel Qualifications](#) must be consulted.

4.2 **MAJOR DAMAGE**

Major damage includes the following:

- Weld repairs:
 - To any load path components;

- On band or any linkage components;
- Modifications to any load bearing equipment such as oversizing or undersizing pin fits.

All major damage must be repaired and requires an NDT inspection upon completion. Repairs may be completed in a field environment provided they can be performed adequately and are accessible for NDT inspection.

4.2.1 MAJOR DAMAGE REPAIR PERSONNEL

Personnel qualifications for major repairs are as per the repair procedure provided by a Professional Engineer or OEM Agent as described in [Section 5.1- Personnel Qualifications](#).

4.3 REPAIR AND MAINTENANCE DOCUMENTATION

All repairs and maintenance performed shall be documented in the CAODC Mast and Overhead Equipment Log Book, or suitable alternative (e.g. equipment maintenance file), 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 5.1.2](#)) that completed the repair and/or maintenance;
- For major repairs:
 - A Professional Engineer or the OEM Agent (as described in [Section 5.1- Personnel Qualifications](#)) who supervised the repair.

Note: *log books must be signed by the repair supervisor.*

5. PERSONNEL QUALIFICATION AND DOCUMENTATION

5.1 PERSONNEL QUALIFICATIONS

5.1.1 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 and/or service rig maintenance (as applicable).

Examples of senior operations personnel include: Professional Engineers, Journeymen Heavy Duty Mechanic and/or Millwrights, OEM Agents, Mechanical and/or maintenance managers and senior operations personnel such as Rig Managers, Field Superintendents, and Operations Managers.

5.1.2 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 and/or service rig maintenance (as applicable).

5.1.3 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.

5.1.4 PROFESSIONAL ENGINEERS

Professional Engineer's shall have:

- Previous experience and training in structural and/or mechanical design and analysis;
- A practical working knowledge of the 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.

5.1.5 ORIGINAL EQUIPMENT MANUFACTURERS (OEM)

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

5.1.6 ORIGINAL EQUIPMENT MANUFACTURER AGENT

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

5.1.7 WELDERS

Welders must hold a valid Journeyman Welder certificate and have previous experience in drilling and/or service rig maintenance (as applicable).

5.2 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 5 - 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.

5.3 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.