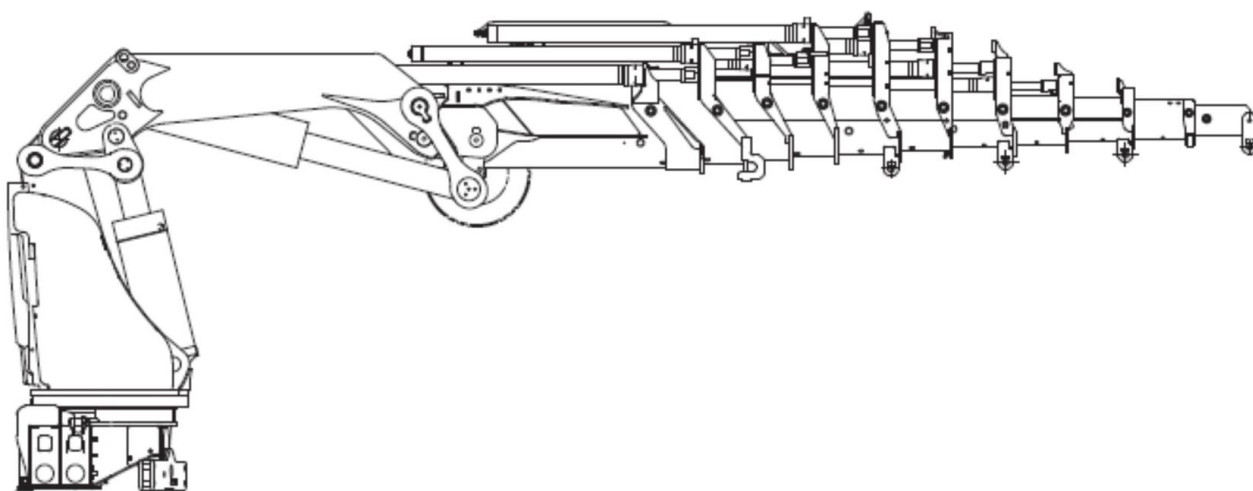


# Folding Boom Crane Operator Standards

## Unlimited Tonnage

July 2022



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## FOREWORD

This Program Outline is for use in guiding competency based training of crane operators who operate Boom Trucks with Folding Boom Cranes with capacity (unlimited tonnage). This includes the following boom crane types:

- Articulating boom
- Articulating boom with hydraulic extensions

The program outline contains Knowledge Units and Workplace Unit Standards of Competence (Workplace Units).

Knowledge units are achieved outside the performance of the learner's regular work as for example in a classroom or through self study of learning resources.

Workplace Units build upon the Knowledge Units and allow the learner to gather naturally occurring evidence of workplace performance while they work. Evidence is assessed against the performance standard defined by industry which is twinned with each task outlined in the Workplace Unit.

Typically credit for Knowledge Units will be achieved through learning sponsored by the Industry Training Authority. The Knowledge Units in this document define the desired outcome for learners to achieve in the theoretical portions of training. Industry wishes learners to have options in achieving credit for Knowledge Units and it is that methods will be devised to enable learners to achieve these outcomes using a variety of non-traditional learning methodologies such as distance education and self-study.

Safe working practices, though not always specified in each of the competencies, are a part of the safe working and learning conditions underlying all these standards and will be required in the presentation of evidence to meet these standards.

This Program Outline includes a list of recommended reference textbooks that are available to support achievement of the Knowledge Units. The final section of the Outline provides some direction by industry on training options for the program as a whole.

## **ACKNOWLEDGEMENTS**

### **Development of the Standards**

These Unit Standards were developed through extensive consultation with a broad cross section of stakeholders in BC's mobile crane industry – crane owners, operators and other occupations which make occasional yet regular use of cranes.

The BC Association for Crane Safety (BCACS) is a non profit society which was formed in 2005 to lead and coordinate activities and initiatives which promote safer crane operation in BC. BCACS was started and is governed by BC's Crane Industry through a volunteer board of crane industry stakeholders. A main area of concern has been setting the standard for competent operation in BC and promotion of the industry standard to drive excellence in crane training.

The BCACS led the development of these standards through funding support of WorkSafe BC and the Industry Training Authority of BC.

In 2005 a representative group of crane owners from the Mobile Crane, Boom Truck and Tower Crane industries in BC began work to identify the Core Standards of Competence required of all Crane Operators in BC. To begin this work the Skills Profiles for Operating Engineers, produced by the Construction Sector Council, were used.

In mid 2006 the industry had identified a Common Core of Competence Standards across all crane types. The core competencies were drawn from three sets of revised Competency Profiles endorsed by the industry in 2006. These are the profiles:

- 1) Mobile Crane
  - a) Mobile Crane 80 tonnes and under
  - b) Mobile Unlimited tonnage
  - c) Mobile Lattice Friction
  - d) Mobile Lattice Hydraulic
- 2) Boom Trucks
  - a) Boom Folding 22 tonnes and under
  - b) Boom Folding (unlimited tonnage)
  - c) Boom Stiff 40 tonnes and under
  - d) Boom Stiff (unlimited tonnage)
- 3) Tower Cranes
  - a) Tower Crane

These Competency Profiles and the Core components were submitted to the Industry Training Authority for approval as revised program standards in July of 2006. They were approved by

the ITA board shortly thereafter.

In October 2006 the ITA Board approved funding to develop industry's requested modifications to the Mobile Crane and Boom Truck Crane Operator Apprenticeship with a portion of the development funds assigned to develop the Crane Common Core Standards. The BCACS was awarded development funds to build the Boom Crane Program Standards and Assessment Tools (which includes the Common Core) as an integrated on job / off job Competency Based Qualification.

The Standards in this Outline build upon the Crane Common Core and make up the Program for Boom Truck with Folding Boom (unlimited tonnage).

BCACS contracted this work to Fulford Harbour Group and Durham College in 2007. Through the first quarter of 2007 a group of Subject Matter Experts (SMEs) met to validate the Competency Standards developed from the Industry Endorsed Competency Profile. This group was made up of the following SMEs:

Barry Conroy	Richard Hobman
Gord Lindberg	Terry Lindal
Grant Washington	Brad Paddock
Steve Neil	Rob Falk
Don Cousins	Paul Welder

The development team wishes to thank the SMEs for their dedication, Fraser Cocks Executive Director and Rob Magee Chairman of the BCACS for their support in pioneering development of an innovative approach to competency based crane training, Russel Robertson of the ITA for insight and guidance through his unstinting sharing of international competency based training best practice and lastly Don Nelson of Work Safe BC for the unwavering commitment to proof of competence as the foundation of BC's crane regulations.

This work would not have been possible without the contribution of thousands of hours of industry stakeholder time through the BCACS task groups. This group expressed great patience in opening new waters for BC Crane Training and their efforts are appreciated.

## **Validation: Common Core and Mobile Crane Standards**

The standards were validated by the following Multi-Crane Stakeholder and SME Group:

### **Name**

Fraser Cocks

Barry Conroy

Gord Lindberg

Grant Washington

Steve Neil

Don Cousins

Richard Hobman

Terry Lindal

Brad Paddock

Rob Falk

Paul Welder

These Competency Standards were validated by the above SME group on February 15<sup>th</sup> 2007 and are subject to adjustment through the end of 2007 as they are piloted.

Thereafter these standards are valid until 2011 when industry has scheduled a formal review of their competence standards.

## **Mechanism for Adjustment**

The BC Association for Crane Safety is industry's lead body in coordinating development of and updates to these standards.

For revision suggestions please e-mail [info@bccranesafety.ca](mailto:info@bccranesafety.ca).

BCACS will endeavour to respond as quickly as possible to suggestions or concerns over the standards. Some suggestions or requested changes may require an industry consultation to determine their validity and relevance across all sectors of the industry.



### **SAFETY ADVISORY**

Be advised that references to the parts of the WorkSafeBC regulation contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.

# OCCUPATION ANALYSIS CHART

# Folding Boom Crane Operator Standards Unlimited Tonnage

## Core & Boom Truck Operator Folding Boom unlimited tonnage Competency Profile Chart

<b>1. Safety (CS)</b>	<b>1.1 K</b> Demonstrate knowledge of safe working practices for crane operators	<b>1.2 K</b> Demonstrate knowledge of power line hazards and high voltage equipment	<b>1.3 W</b> Comply with WorkSafeBC and OH & S regulations			
	1	1	1			
<b>2. Communications (CCOM)</b>	<b>2.1 K</b> Demonstrate knowledge of personnel involved in crane operations	<b>2.2 K</b> Demonstrate knowledge of hand signals	<b>2.3 K</b> Demonstrate knowledge of radio communications	<b>2.4 K</b> Demonstrate knowledge of workplace communications	<b>2.5 W</b> Use hand signals in the workplace	<b>2.6 W</b> Use radio communications in the workplace
	1	1	1	1	1	1
	<b>2.7 W</b> Communicate information clearly and check for understanding in the workplace					
<b>3. Cranes (AC)</b>	<b>3.1 K</b> Demonstrate knowledge of types of cranes and classifications	<b>3.2 K</b> Demonstrate knowledge of terminology related to craning and craning concepts	<b>3.3 K</b> Demonstrate knowledge of hoisting terminology, functions and systems	<b>3.4 K</b> Demonstrate knowledge of regulatory requirements pertaining to cranes	<b>3.11 K</b> Demonstrate knowledge of components and attachments for boom trucks with folding booms (unlimited tonnage)	<b>3.12 K</b> Demonstrate knowledge of engines and ancillary systems on boom trucks with folding booms (unlimited tonnage)
	1	1	1	1	2	2
	<b>3.13 K</b> Demonstrate knowledge of power transfer for boom trucks with folding booms (unlimited tonnage)					
<b>4. Rigging (CR)</b>	<b>4.1 K</b> Demonstrate knowledge of lifting theory and forces	<b>4.2 K</b> Demonstrate knowledge of rigging hardware, materials, tools and manuals	<b>4.3 K</b> Demonstrate knowledge of types and function of wire rope and chains	<b>4.4 K</b> Demonstrate knowledge of installation, inspection and storage of wire rope	<b>4.5 K</b> Demonstrate knowledge of rigging techniques	<b>4.6 W</b> Use rigging hardware and tools in the workplace
	1	1	1	1	1	1

## Folding Boom Crane Operator Standards Unlimited Tonnage

5. Load Charts (CLC)	5.1 K Demonstrate knowledge of determining weight loads using fundamental math functions and calculations	5.2 K Demonstrate knowledge of loading and lifting	5.3 W Interpret load charts and load study drawings to configure crane for workplace operation			
	1	1	1			
6. Transportation and Delivery (ATD)	6.8 K Demonstrate knowledge of BC Ministry of Transportation – Commercial Transport rules and regulations as they pertain to driving boom trucks with folding booms (unlimited tonnage)	6.9 K Demonstrate knowledge to prepare a boom truck with a folding boom (unlimited tonnage) for highway/road travel				
	2	2				
7. Site Planning and Crane Positioning (ASPCP)	7.6 K Demonstrate knowledge to locate and safely position a boom truck with a folding boom (unlimited tonnage) using site assessment tools	7.7 W Conduct an accurate site assessment and safely position a boom truck with a folding boom (unlimited tonnage) in the workplace				
	2	2				
8. Crane Operations (ACO)	8.1 K Demonstrate knowledge of pre-operational requirements in crane operations	8.4 W Demonstrate crane set-up per manufacturer's instructions (except Task 4 in Mobile)	8.9 K Demonstrate knowledge of operating a boom truck with a folding boom (unlimited tonnage)	8.10 W Operate a boom truck with a folding boom (unlimited tonnage) to safely lift and place loads in a workplace		
	1	1	2	2		
9. Maintenance and Service (AMS)	9.1 W Maintain an equipment logbook to retain a permanent written record of maintenance and repairs	9.13 K Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)	9.14 K Demonstrate knowledge of servicing and maintenance procedures on boom trucks with folding booms (unlimited tonnage)	9.15 W Complete maintenance checklists (engine on/ engine off) and maintain engines on a boom truck with a folding boom (unlimited tonnage) to manufacturer's specifications	9.16 W Perform routine inspections and maintenance of hydraulic systems on a boom truck with a folding boom (unlimited tonnage)	9.17 W Inspect monitoring devices and control mechanisms on a boom truck with a folding boom (unlimited tonnage)
	1	2	2	2	2	2

# **CORE & BOOM TRUCK OPERATOR FOLDING BOOM UNLIMITED TONNAGE PROGRAM OUTLINE**



<b>Core Level</b>		<b>Theory</b>	<b>Practical</b>
<b>Unit</b>	<b>Section 1 – Safety Knowledge</b>	<b>% of Time 5%</b>	
CS 1.1 K	Demonstrate knowledge of safe working practices for crane operators	✓	
CS 1.2 K	Demonstrate knowledge of power line hazards and high voltage equipment	✓	
<b>Unit</b>	<b>Section 1 – Safety Practical (Workplace) standards</b>	<b>Must meet</b>	
CS 1.3 W	Comply with WorkSafeBC and OH & S regulations		✓
<b>Total Percentage for Section 1</b>		<b>5%</b>	
<b>Unit</b>	<b>Section 2 - Communications Knowledge</b>	<b>% of Time 5%</b>	
CCOM 2.1 K	Demonstrate knowledge of personnel involved in crane operations	✓	
CCOM 2.2 K	Demonstrate knowledge of hand signals	✓	
CCOM 2.3 K	Demonstrate knowledge of radio communications	✓	
CCOM 2.4 K	Demonstrate knowledge of workplace communications	✓	
<b>Unit</b>	<b>Section 2 - Communications Practical standards</b>	<b>Must meet</b>	
CCOM 2.5 W	Use hand signals in the workplace		✓
CCOM 2.6 W	Use radio communications in the workplace		✓
CCOM 2.7 W	Communicate information clearly and check for understanding in the workplace		✓
<b>Total Percentage for Section 2</b>		<b>5%</b>	

## SUGGESTED INSTRUCTIONAL TIME ALLOTMENTS CORE





Core Level			Theory	Practical
<b>Unit</b>	<b>Section 3 – Cranes Knowledge Time</b>	<b>% of</b>	<b>10%</b>	
CC 3.1 K	Demonstrate knowledge of types of cranes and classifications		✓	
CC 3.2 K	Demonstrate knowledge of terminology related to craning and craning concepts		✓	
CC 3.3 K	Demonstrate knowledge of hoisting terminology, functions and systems		✓	
CC 3.4 K	Demonstrate knowledge of regulatory requirements pertaining to cranes		✓	
<b>Total Percentage for Section 3</b>			<b>10%</b>	
<b>Unit</b>	<b>Section 4 – Rigging Knowledge Time</b>	<b>% of</b>	<b>20%</b>	
CR 4.1 K	Demonstrate knowledge of lifting theory and forces		✓	
CR 4.2 K	Demonstrate knowledge of rigging hardware, materials, tools and manuals		✓	
CR 4.3 K	Demonstrate knowledge of types and function of wire rope and chains		✓	
CR 4.4 K	Demonstrate knowledge of installation, inspection and storage of wire rope		✓	
CR 4.5 K	Demonstrate knowledge of rigging techniques		✓	
<b>Unit</b>	<b>Section 4 - Rigging Practical standards</b>		<b>Must meet</b>	
CR 4.6 W	Use rigging hardware and tools in the workplace			✓
<b>Total Percentage for Section 4</b>			<b>20%</b>	
<b>Unit</b>	<b>Section 5 – Load Charts Knowledge</b>	<b>% of Time</b>	<b>30</b>	
CLC 5.1 K	Demonstrate knowledge of determining weight loads using fundamental math functions and calculations		✓	
CLC 5.2 K	Demonstrate knowledge of loading and lifting		✓	
<b>Unit</b>	<b>Section 5 – Load Charts Practical standards</b>		<b>Must meet</b>	
CLC 5.3 W	Interpret load charts and load study drawings to configure crane for workplace operation			✓
<b>Total Percentage for Section 5</b>			<b>30%</b>	

<b>Core Level</b>		<b>Theory</b>	<b>Practical</b>
<b>Unit</b>	<b>Section 8 – Crane Operations - Knowledge</b>	<b>30%</b>	
CCO 8.1 K	Demonstrate knowledge of pre-operational requirements in crane operations	✓	
<b>Unit</b>	<b>Section 8 – Crane Operations – Practical standards</b>	<b>Must meet</b>	
CCO 8.4 W	Demonstrate crane set-up per manufacturer's instructions (except Task 4 in Mobile)		✓
<b>Total Percentage for Section 8</b>		<b>30%</b>	
<b>Unit</b>	<b>Section 9 - Maintenance &amp; Service – practical standards</b>	<b>Must meet</b>	
CMS 9.1 W	Maintain an equipment logbook to retain a permanent written record of maintenance and repairs		✓
<b>Total Percentage for Section 9</b>			
<b>TOTAL ALL UNITS</b>		<b>100%</b>	

## SUGGESTED INSTRUCTIONAL TIME ALLOTMENTS

### FOLDING BOOM TRUCK UNLIMITED TONNAGE

Boom Truck with Folding Boom (unlimited tonnage)		Theory	Practical
<b>Unit</b>	<b>Section 3 – Cranes - Knowledge</b>	<b>% of Time 20</b>	
AC 3.11 K	Demonstrate knowledge of components and attachments for boom trucks with folding booms (unlimited tonnage)	✓	
AC 3.12 K	Demonstrate knowledge of engines and ancillary systems on boom trucks with folding booms (unlimited tonnage)	✓	
AC 3.13 K	Demonstrate knowledge of power transfer for boom trucks with folding booms (unlimited tonnage)	✓	
<b>Total Percentage for Section 3</b>		<b>20%</b>	
<b>Unit</b>	<b>Section 6 - Transportation &amp; Delivery - Knowledge</b>	<b>% of 5%</b>	
ATD 6.8 K	Demonstrate knowledge of BC Ministry of Transportation – Commercial Transport rules and regulations as they pertain to driving boom trucks with folding booms (unlimited tonnage)	✓	
ATD 6.9 K	Demonstrate knowledge to prepare a boom truck with a folding boom (unlimited tonnage) for highway/road travel	✓	
<b>Total Percentage for Section 6</b>		<b>5%</b>	
<b>Unit</b>	<b>Section 7 - Site Planning &amp; Crane Positioning - Knowledge</b>	<b>20%</b>	
ASPCP 7.6 K	Demonstrate knowledge to locate and safely position a boom truck with a folding boom (unlimited tonnage) using site assessment tools	✓	
<b>Unit</b>	<b>Section 7 - Site Planning &amp; Crane Positioning - Practical</b>	<b>Must meet standards</b>	
ASPCP 7.7 W	Conduct an accurate site assessment and safely position a boom truck with a folding boom (unlimited tonnage) in the workplace		✓
<b>Total Percentage for Section 7</b>		<b>20%</b>	

<b>Boom Truck with Folding Boom (unlimited tonnage)</b>		<b>Theory</b>	<b>Practical</b>
<b>Unit</b>	<b>Section 8 – Crane Operations - Knowledge</b>	<b>40%</b>	
ACO 8.11 K	Demonstrate knowledge of operating a boom truck with a folding boom (unlimited tonnage)	✓	
<b>Unit</b>	<b>Section 8 – Crane Operations - Practical</b>	<b>Must meet standards</b>	
ACO 8.12 W	Operate a boom truck with a folding boom (unlimited tonnage) to safely lift and place loads in a workplace		✓
<b>Total Percentage for Section 8</b>		<b>40%</b>	
<b>Unit</b>	<b>Section 9 - Maintenance &amp; Service - Knowledge</b>	<b>% of Tin</b>	<b>15%</b>
AMS 9.13 K	Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)	✓	
AMS 9.14 K	Demonstrate knowledge of servicing and maintenance procedures on boom trucks with folding booms (unlimited tonnage)	✓	
<b>Unit</b>	<b>Section 9 - Maintenance &amp; Service - Practical</b>	<b>Must meet standards</b>	
AMS 9.15 W	Complete maintenance checklists (engine on/ engine off) and maintain engines on a boom truck with a folding boom (unlimited tonnage) to manufacturer's specifications		✓
AMS 9.16 W	Perform routine inspections and maintenance of hydraulic systems on a boom truck with a folding boom (unlimited tonnage)		✓
AMS 9.17 W	Inspect monitoring devices and control mechanisms on a boom truck with a folding boom (unlimited tonnage)		✓
<b>Total Percentage for Section 9</b>		<b>15%</b>	
		<b>100%</b>	

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 1 SAFETY**

## **SECTION 1 – SAFETY**

### **Unit Standard CS 1.1 K**

#### **SAFETY**

#### **Demonstrate knowledge of safe working practices for crane operators Core**

##### **Purpose**

This unit of competency covers knowledge of potential hazards in the workplace.

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS) and delivery agency policy

##### **Task 1**

Describe workplace hazards in terms of the WorkSafeBC OHS regulations and how to eliminate, isolate, or minimize hazards.

##### **Performance standards**

1.1 Energy source hazards are described.

Must include

1. hydraulic
2. steam

3. electrical
4. air
5. stored energy
6. gravitational
7. pinch points
8. barriers
9. guards

1.2 Overhead hazards are described.

Must include

1. power lines
2. cranes
3. scaffolding
4. falling objects

1.3 Falling and lifting hazards and safe lifting procedures are described.

Must include

1. open holes
2. scaffolding

1.4 Mobile machinery hazards are described.

Must include

1. trains
2. trucks
3. cranes
4. forklift trucks
5. mobile conveyor

1.5 Rotating equipment hazards are described.

Must include

1. belts
2. pulleys
3. sheaves
4. conveyors
5. sprockets
6. chains
7. couplings
8. pinch points
9. barriers
10. guards

1.6 Gas hazards are described

**Must include**

1. explosive gases
2. poisonous gases
3. atomizers
4. oxygen deprived atmospheres
  - a. methane (CH<sub>4</sub>)
  - b. lower explosive limit (LEL)
  - c. hydrogen sulphide (H<sub>2</sub>S).

**Task 2**

Demonstrate knowledge of worksite hazard risk assessment and risk management procedures.

**Performance standards**

- 2.1 Risk assessment procedures and risk management procedures are described.

**Must include**

1. responsibility to maintain a safe work environment
2. changing weather
3. frozen surfaces
4. traffic
5. location
6. operating blind
7. slips
8. trips and falls
9. injury to others
10. injury from moving machinery.

- 2.2 Methods of communicating risks and risk situations to others are explained.

**Must include**

1. signage
2. tagging
3. verbal communications
4. written communications
5. safe work cards
6. risk hazard assessment procedures

- 2.3 Notifying local utilities when operating near utility lines or potential hazards is explained.



### **Task 3**

Demonstrate knowledge of accident and incident reporting procedures.

3.1 Requirements for recording an accident and incident are explained

Must include

1. report form completion
2. report form processing

### **Task 4**

Describe personal protection equipment.

#### **Performance standards**

4.1 Breathing protection equipment is described.

Must include

1. respirators and filters
2. dust protection
3. hand protection

4.2 Eye protection equipment in terms of goggles and shields.

4.3 Personal protective equipment and clothing (PPE) is described.

Must include

1. hard hat
2. boots
3. eyewear
4. hearing protection

### **Task 5**

Demonstrate knowledge of response to fire emergencies.

#### **Performance standards**

5.1 Fire extinguisher types, servicing and use are described.

Must include

1. extinguisher types and capacities
2. use of extinguishers

5.2 Procedures for fighting electrical fires are explained.

Must include

1. isolate power

2. fire fighting equipment

5.3 Fire emergency response and evacuation procedures in accordance with industry practice are described.

### **Task 6**

Describe procedure for emergency rescue from a crane.

#### **Performance standard**

5.1 Emergency rescue procedures are described.

Must include

1. tower crane operator station rescues
2. crane accident
3. crane fire

### **Task 7**

Describe the 3 point contact method when mounting and dismounting equipment

Must include

1. cranes
2. other heavy equipment

## Unit Standard CS 1.2 K

### SAFETY

Demonstrate knowledge of power line hazards and high voltage equipment

#### Purpose

This unit standard covers knowledge about crane operation around high voltage equipment.

#### Prerequisite

CS 1.1 K Demonstrate knowledge of safe working practices for crane operators

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CSA Standard Z150-2020 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual,  
Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-2020 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS)  
and delivery agency policy  
BC Hydro High Voltage safety manual

#### Task 1

Describe procedures for operating in proximity of overhead conductors.

## **Performance standard**

- 1.1 Operating procedures in the vicinity of overhead conducts are described.

Must include

1. interpret signage related to high voltage
2. state safe limits of approach to overhead conductors

- 1.2 Procedures if contact is made with high voltage equipment are explained.

Must include

1. break crane contact with wire if possible
2. stay in cab until de-energized by utility company
3. jump clear
  - a. step potential (toe to heel)
4. apply first aid
5. inspect machine for damage caused by contact
6. report contact to job supervisor immediately
7. report contact to WorkSafeBC immediately
8. report contact to utility company immediately
9. record contact in crane Work Record log book

## Unit Standard CS 1.3 W

### Safety

### Comply with WorkSafeBC OHS regulations

#### Purpose

Interpret and comply with WorkSafeBC OHS regulations, standards and guidelines.

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual,

Infrastructure Health & Safety Association of Ontario, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS) and delivery agency policy

#### Task 1

Comply with WorkSafeBC OHS regulations and procedures applicable to workers in the industrial workplace by demonstrating knowledge gained in training.

#### Performance standards

- 1.1 The purpose and role of WorkSafeBC is upheld while in the workplace.
- 1.2 The rights and responsibilities of employers and employees are protected and upheld
- 1.3 Reporting procedures are accurately completed

- 1.4 Thorough workplace inspections are performed
- 1.5 WorkSafeBC OHS regulations, standards and guidelines are complied with and adhered to in the workplace.

Must include

- 1. all regulations applicable in the apprentices workplace

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 2 COMMUNICATIONS**

## **SECTION 2 – COMMUNICATIONS**

### **Unit Standard CCOM 2.1 K**

#### **Communications**

#### **Demonstrate knowledge of personnel involved in crane operations - core**

##### **Purpose**

Demonstrate knowledge of the personnel involved in crane operations and in a traditional workplace.

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual,  
Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### **Task 1**

Describe the personnel involved in a workplace and the roles they play.

##### **Performance standards**

1.1 The roles and responsibilities are explained for personnel in the workplace

Must include

1. site supervisor



2. crane operator
3. rigger
4. signaller
5. CSO – construction safety officer

## Unit Standard CCOM 2.2 K

### Communications

#### Demonstrate knowledge of hand signals – core

##### Purpose

Demonstrate knowledge of hand signals used in crane operations

##### Prerequisite

Unit Standard 2.1 K Demonstrate knowledge of personnel involved in crane operations

##### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual,  
Infrastructure Health & Safety Association, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes, CSA Standard Z248 Safety Code for Tower Cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### Task 1

Describe the hand signals used during crane operations.

##### Performance standards

1.1 Hand signals are accurately described

Folding Boom Crane Operator Standards Unlimited Tonnage

- 1.2 Hand signals are accurately identified and interpreted
- 1.3 Requirements of the crane hand signaller are explained

## Unit Standard CCOM 2.3 K

### Communications

### Demonstrate knowledge of radio communications - core

#### Purpose

Demonstrate knowledge of the use of radio communications in the workplace.

#### Prerequisites

Unit Standard 2.1 K Demonstrate knowledge of personnel involved in crane operations

Unit Standard 2.2 K Demonstrate knowledge of hand signals

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual,

Infrastructure Health & Safety Association of Ontario, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Task 1

Describe the use of two-way electronic voice communication devices

#### Performance standards

1.1 The basic functions of the radio communication devices are described

1.2 Language and terminology used during radio communication is explained

Must include

1. short form words and phrases
2. use of 12 o'clock (clock face positioning reference) to aid in direction giving and interpreting

1.3 Use of two-way communication devices are demonstrated and tested in a class room environment.

Must include

1. Lost contact by radio and requirements to stop operation

## Unit Standard CCOM 2.4 K

### Communications

### Demonstrate knowledge of workplace communications - core

#### Purpose

Demonstrate knowledge of the use of effective communications in the workplace.

#### Prerequisite

Unit Standard 2.1 K Demonstrate knowledge of personnel involved in crane operations

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual,  
Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Definitions

*Active listening* –the skills of listening. These skills may include but are not limited to questioning, reading and responding to body language, use of silence, paraphrasing, reflecting feels, summarizing

#### Task 1

Demonstrate knowledge of basic workplace documents and explain the need to correctly act on the content

## **Performance standards**

- 1.1 Basic written communications in the workplace are described and interpreted accurately.

Must include

1. work orders and written instructions
2. work records
3. company logs
4. basic project plan
5. written reports

- 1.2 Techniques to ensure clear communication is achieved are explained

Must include

1. English workplace vocabulary
2. non-verbal communications
3. use of tone and volume
4. slang
5. cultural and geographical differences in language
6. tact
7. diplomacy
8. assertiveness

- 1.3 Techniques for checking understanding are described.

Must include

1. active and focused listening
2. recapping the key points
3. restating the instruction or sentence
4. clarifying questions

- 1.4 Hazards to personnel and equipment when communication breaks down in terms of safety and liability are described.

- 1.5 Causes of communication breakdowns are described.

Must include

1. noise
2. language differences
3. hearing problem (that may not have been identified)
4. bias
5. attitude
6. issues with egos and arrogance
7. issues with timidity and fear of speaking up

## **Unit Standard CCOM 2.5 W**

### **Communications**

#### **Use hand signals in the workplace - core**

##### **Purpose**

Demonstrate ability to use hand signals correctly in crane operations

##### **Prerequisites**

Unit Standard CCOM 2.1 K Demonstrate knowledge of personnel involved in crane operations

Unit Standard CCOM 2.2 K Demonstrate knowledge of hand signals

Unit Standard CCOM 2.3 K Demonstrate knowledge of radio communications

Unit Standard CCOM 2.4 K Demonstrate knowledge of workplace communications

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual,

Infrastructure Health & Safety Association, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

### **Task 1**

Use hand signals and respond to hand signals during crane operations.



**Performance standards**

- 1.1 Hand signals are accurately used
- 1.2 Hand signals of others are accurately identified and interpreted
- 1.3 Hand signals aided in the safe and correct completion of a crane operation

## Unit Standard CCOM 2.6 W

### Communications

#### Use radio communications in the workplace - core

##### Purpose

Demonstrate ability to use radio communications in the workplace.

##### Prerequisites

Unit Standard CCOM 2.1 K Demonstrate knowledge of personnel involved in crane operations

Unit Standard CCOM 2.2 K Demonstrate knowledge of hand signals

Unit Standard CCOM 2.3 K Demonstrate knowledge of radio communications

Unit Standard CCOM 2.4 K Demonstrate knowledge of workplace communications

##### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice.

CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 1997

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

### Task 1

Use a two-way electronic voice communication device in the workplace

## **Performance standards**

- 1.1 Basic functions of the radio communication devices are used according to equipment instructions
- 1.2 Language and terminology used during radio communication is clearly understood
- 1.3 Two-way communication devices are used to relay clear, concise, relevant information.

## Unit Standard CCOM 2.7 W

### Communications

### Communicate information clearly and check for understanding in the workplace – core

#### Purpose

Demonstrate knowledge of the use of effective and clear communications in the workplace.

#### Prerequisite

Unit Standard CCOM 2.1 K Demonstrate knowledge of personnel involved in crane operations

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Definitions

*Active listening* –the skills of listening. These skills may include but are not limited to questioning, reading and responding to body language, use of silence, paraphrasing, reflecting feels, summarizing

## **Task 1**

Read and demonstrate the correct interpretation of workplace documents

### **Performance standards**

- 1.1 Use and interpret basic written communications in the workplace to accurately perform tasks as assigned.

Must include

1. work orders and written instructions
2. maintenance records
3. company logs
4. basic project plan
5. written reports.

- 1.2 Use techniques to ensure clear communication is achieved in the workplace

Must include

1. English workplace vocabulary
2. non-verbal communications
3. use of tone and volume
4. colloquialisms
5. cultural and geographical differences in language
6. tact
7. diplomacy
8. assertiveness.

- 1.3 Use techniques for checking understanding with colleagues

Must include

1. active and focused listening
2. recapping the key points
3. restating the instruction or sentence
4. clarifying questions.

- 1.4 Breakdown in communication does not occur and personnel and equipment are not exposed to hazards

- 1.5 Communicates clearly, fairly and accurately despite workplace communication barriers.

May include

1. noise
2. language differences
3. hearing problem (that may not have been identified)

4. bias
5. attitude
6. issues with egos and arrogance
7. issues with timidity and fear of speaking up.

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 3 CRANES**

## **SECTION 3 – CRANES**

### **Unit Standard CC 3.1 K**

#### **Cranes**

#### **Demonstrate knowledge of types of cranes and classifications- Core**

##### **Purpose**

Demonstrate knowledge of types of cranes.

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### **Task 1**

Describe the types of cranes and their key functions.

##### **Performance standards**

1.1 The purpose and functions of cranes are described.

Must include

1. boom trucks
2. mobile cranes
3. tower cranes
4. self erect cranes



1.2 Cranes are categorized using classifications.

Must include

1. carrier types (e.g. crawler, rubber)
2. hoist mechanisms (e.g. hydraulic, conventional, electrical)
3. lifting capacity
4. boom types (e.g. lattice, hydraulic, knuckle boom, luffing boom.)
5. heavy lift cranes (e.g. super lift, ringer )
6. tower cranes
7. self-erect cranes

## **Unit Standard CC 3.2 K**

### **Cranes**

### **Demonstrate knowledge of terminology related to craning and craning concepts - core**

#### **Purpose**

Demonstrate knowledge of terminology related to craning and craning concepts.

#### **Prerequisite**

Unit Standard CC 3.1 K Demonstrate knowledge of cranes and classifications

Unit Standard CC 3.2 K Demonstrate knowledge of crane components and attachments

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### **Task 1**

Describe terms related to craning commonly used in the work environment

#### **Performance standards**

1.1 Terms related to craning are explained and must include:

1. wire rope
2. fittings
3. drums
4. hooks
5. sheaves
6. winch
7. slew / swing
8. hoist
9. boom
10. swing brake
11. swing dog
12. mast
13. gantry
14. overload protection systems (limits)

### **Task 5**

Demonstrate knowledge of travel braking systems in crane operations.

#### **Performance standards**

- 5.1 Components of the braking systems are described and their functions explained

Must include

1. air compressor
2. brake chambers
3. drums
4. brake bands
5. slack adjusters

- 5.2 Defects or malfunctions of braking systems are described

Must include

1. air compressors
2. brake chambers
3. drums
4. brake bands
5. slack adjusters

## Unit Standard CC 3.3 K

### Cranes

### Demonstrate knowledge of hoisting terminology, functions and systems - core

#### Purpose

Demonstrate knowledge of hoisting terminology, functions and systems for crane operations

#### Prerequisite

Unit Standard CC 3.1 K Demonstrate knowledge of cranes and classifications

Unit Standard CC 3.2 K Demonstrate knowledge of crane components and attachments

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2019, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

#### Task 1

Demonstrate knowledge of hoisting functions and systems for crane operation

#### Performance Standards

1.1 Components of hoisting systems are described and their functions explained

Must include

1. hydraulic boom
2. lattice boom
3. drums
4. hooks
5. sheaves
6. winch
7. brakes and clutches
8. trolley
9. roller
10. swing bearing

1.2 Defects or malfunctions of hoisting systems are described

Must include

1. hydraulic boom
2. lattice boom
3. drums
4. hooks
5. sheaves
6. winch
7. brakes and clutches
8. trolley
9. roller
10. swing bearing

## **Unit Standard CC 3.4 K**

### **Cranes**

### **Demonstrate knowledge of regulatory requirements pertaining to cranes - Core**

#### **Purpose**

Demonstrate knowledge of the regulations to legally and safely operate cranes.

#### **Prerequisite**

Unit Standard CC 3.1 K Demonstrate knowledge of cranes and classifications  
Unit Standard CC 3.2 K Demonstrate knowledge of crane components and attachments  
Unit Standard CC 3.3 K Demonstrate knowledge of engines and ancillary systems

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS) and delivery agency policy  
IPT Crane and rigging manual

#### **Task 1**

Demonstrate knowledge of how the regulations apply to the operation of cranes in a workplace.

## **Performance standards**

- 1.1 The impact of current regulations on workplace practices and crane operations is described

Must include

1. WorkSafeBC Occupational Health and Safety (OHS) regulations
2. The Hoisting and Rigging Safety Manual
3. Infrastructure Health & Safety Association of Ontario, 2009
4. CAN/CSA-Z150-20 Safety Code for Mobile Cranes
5. CSA Standard Z248 Safety Code for Tower Cranes
6. ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane
7. Workplace Hazardous Material Information System (WHMIS)
8. Delivery agency policy

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 4 RIGGING**



## **SECTION 4 – RIGGING**

### **Unit Standard CR 4.1 K**

#### **Rigging**

#### **Demonstrate knowledge of lifting theory and forces – Core**

##### **Purpose**

Demonstrate knowledge of the fundamentals of leverage

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### **Task 1**

Demonstrate knowledge of the principles of leverage

##### **Performance standards**

1.1 The principles of leverage are described

Must include

1. Sling angles
2. Class 1 lever
3. Class 2 lever

4. Class 3 lever
5. Centre of gravity
6. Sine of angle

## Unit Standard CR 4.2 K

### Rigging

### Demonstrate knowledge of rigging hardware, materials, tools and manuals - Core

#### Purpose

Demonstrate knowledge of rigging hardware, materials, tools and manuals to safely rig a crane.

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Task 1

Demonstrate knowledge of rigging hardware used in crane operations

#### Performance standards

1.1 Rigging hardware and its uses are described

Must include

1. hooks
2. shackles

3. slings
4. spreader bars
5. equalizer beams
6. chains
7. bridles
8. chokers

- 1.2 Specific information on rigging hardware from manufacturer's and rigging manuals is described and interpreted accurately according to industry standards

## **Task 2**

Demonstrate knowledge of inspection, service and repairs to rigging hardware.

- 2.1 The procedure for inspecting rigging hardware is described as per manufacturer's manuals
- 2.2 Requirements for examining rigging hardware are described

Must include

1. excessive wear
2. damage
3. fraying
4. cracks
5. safety clips
6. broken wire

## **Task 3**

- 3.1 Criteria for removing rigging hardware from service are described according to appropriate BC regulations
- 3.2 The procedure to remove clips is described as per manufacturer's manual and company procedures.
- 3.3 The process for removing rigging hardware is described

Must include

1. remove from crane and destroy.

- 3.4 The process of acceptable repairs to rigging hardware is described as prescribed by manufacturer

Must include

1. nylon sling – no repair
2. wire sling – no repair

3. chain – repair by manufacturer only
4. Kevlar – repair by manufacturer only

3.5 Defects and deficiencies are reported to appropriate personnel

Must include

1. job supervisor
2. crane supervisor
3. enter in crane logbook

**Task 4**

Demonstrate knowledge to store rigging hardware after use

- 4.1 Criteria for storing rigging hardware is explained as per manufacturer's guidelines

## Unit Standard CR 4.3 K

### Rigging

### Demonstrate knowledge of types and functions of wire rope and chains - core

#### Purpose

Demonstrate knowledge of wire rope and chains in crane operations.

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Task 1

Describe types of wire used in crane operation and their functions.

#### Performance standards

1.1 Types of wire rope, their characteristics, classifications and uses are described

Must include

1. Ordinary construction
2. Warrington construction
3. Seale construction
4. Filler construction

- 1.2 Interpret manufacturer's certificate of origin for wire rope

**Task 2**

Describe grades of chain and their uses in crane operations.

**Performance Standards**

- 2.1 Grades of chain and their uses are described

Must include

1. grade 8 for hoisting
2. grade 6 or 7 to tie down loads
3. grade 1000 – pending

- 2.2 Interpret manufacturer's certificate of origin and capacity tags on chains

## Unit Standard CR 4.4 K

### Rigging

### Demonstrate knowledge of installation, inspection and storage of wire rope - core

#### Purpose

Demonstrate knowledge of inspection, installation and storage of wire rope for crane operation

#### Prerequisites

Unit Standard CR 4.1 K Demonstrate knowledge of lifting theory and forces

Unit Standard CR 4.2 K Demonstrate knowledge of rigging hardware, materials and tools

Unit Standard CR 4.3K Demonstrate knowledge of types and functions of wire rope and chains

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice.

CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

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CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

#### Task 1

Demonstrate knowledge of the process for inspection and replacement of wire ropes in accordance with manufacturer's recommendations



1.1 The inspection and examination procedure is described for wire rope defects

Must include

1. frayed wire rope
2. broken strands
3. lubrication
4. excessive wear
5. bird caging
6. kinking
7. flattening
8. proper spooling
9. broken wires

1.2 The criteria to remove damaged or defective rope is explained according to WorkSafeBC regulations.

1.3 The process to remove damaged or defective wire rope is described according to manufacturer's guidelines.

1.4 The process to examine the drum to ensure proper installation is described.

1.5 The process to record and report the inspection defects and deficiencies is explained.

Must include

1. record inspection in logbook
2. record defects in logbook
3. report defects and deficiencies to job supervisor
4. report defects and deficiencies to crane supervisor

## **Task 2**

Demonstrate knowledge of installing the new rope according to manufacturer's instructions.

2.1 New wire rope installation process is described according to manufacturer's requirements.

Must include

1. interpretation of manufacturer's certificate of origin/data plates.

2.2 Wire rope system components are identified.

Must include

1. rope guides
2. drums
3. blocks
4. hooks
5. sheaves
6. wedge and socket termination.

**Task 3**

Demonstrate knowledge of storing wire rope

**Performance Standards**

- 3.1 The criteria for storing wire rope are described according to manufacturer's requirements.

**Task 4**

Demonstrate knowledge of maintenance of wire ropes

**Performance Standards**

- 4.1 Criteria for lubricating wire rope are described

Must include

1. inspection of rope
2. identifying rope needing lubrication.

- 4.2 Procedures to perform maintenance on wire ropes are described as manufacturer dictates

Must include

1. cutting wire ropes
2. cleaning
3. lubrication.

- 4.3 Record wire rope maintenance in the log book within the regulated timeframe.

## Unit Standard CR 4.5 K

### Rigging

### Demonstrate knowledge of rigging techniques – core

#### Purpose

Demonstrate knowledge of rigging techniques as they are applied in the workplace

#### Prerequisites

Unit Standard CR 4.1 K Demonstrate knowledge of lifting theory and forces

Unit Standard CR 4.2 K Demonstrate knowledge of rigging hardware, materials and tools

Unit Standard CR 4.3K Demonstrate knowledge of types and functions of wire rope and chains

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice.

CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

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ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS) and delivery agency policy

#### Task 1

Demonstrate knowledge to assemble appropriate rigging for a given load according to manufacturer's recommendations.

## **Performance standards**

### **1.1 Appropriate slings and hardware are selected for a given load**

Must include

1. determining load weight
2. calculating sling size
3. safe working load (SWL / WLL) of wire rope

### **1.2 Safe and efficient rigging procedures for a given lift are established**

Must include

1. determining load weight
2. calculating sling size
3. safe working load (SWL / WLL) of wire rope.

### **1.3 Rigging is selected in a safe and efficient manner for a given lift**

Must include

1. calculations done
2. safe working load (SWL / WLL) calculated
3. correct sling size.

### **1.4 Load and hardware characteristics are defined.**

Must include

1. advantages and disadvantages of particular hardware
2. characteristics of hardware
3. characteristics of the load.

## Unit Standard CR 4.6 W

### Rigging

### Use rigging hardware and tools in the workplace - core

#### Purpose

This unit standard allows the trainee to demonstrate the knowledge he has gained by performing rigging activities in the workplace

#### Prerequisites

Unit Standard CR 4.1 K Demonstrate knowledge of lifting theory and forces

Unit Standard CR 4.2 K Demonstrate knowledge of rigging hardware, materials and tools

Unit Standard CR 4.3K Demonstrate knowledge of types and functions of wire rope and chains

Unit Standard CR 4.4 K Demonstrate knowledge of installation, inspection and storage of wire ropes

Unit Standard CR 4.5 Demonstrate knowledge of rigging techniques

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

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ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS) and delivery agency policy

### **Task 1**

Assemble appropriate rigging for a given load according to manufacturer's recommendations.

#### **Performance standards**

- 1.1 Appropriate slings, chains, wire ropes and hardware are selected and installed for lifts: concrete equipment and tanks

Must include

1. measure load
2. calculate weight of load
3. calculate sling requirements
4. complete the appropriate rigging
5. wear protective equipment
6. signal correctly

### **Task 2**

Inspect, maintain and store rigging hardware, wire ropes and chains in workplace operations.

#### **Performance Standards**

- 2.1 Rigging hardware, wire ropes and chains are inspected, maintained and stored according to company and manufacturer's specifications and company requirements

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 5 LOAD CHARTS**

## **SECTION 5 – LOAD CHARTS**

### **Unit Standard CLC 5.1 K**

#### **Load Charts**

#### **Demonstrate knowledge of determining weight of loads using fundamental math functions and calculations - core**

##### **Purpose**

This unit provides the basis for determining weigh loads for given lifts by using fundamental math functions and calculations.

##### **Note**

A scientific calculator is required for this unit

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
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Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### **Task 1**

Demonstrate the functions of a scientific calculator to perform mathematical calculations.



## **Performance standards**

### **1.1 Fundamental mathematical functions are performed.**

Must include

1. rounding off
2. fractions
3. metric and imperial units of measure
4. circumference of a circle
5. perimeter of an object
6. surface area of an object
7. Sine of an angle
8. Pythagorean theorem

## **Task 2**

Demonstrate knowledge of accurately calculating load

## **Performance Standards**

### **2.1 Accurate load weights are determined**

Must include

1. volume of an object
2. weight of a cubic unit of an object
3. bearing pressure on the load supporting surfaces
4. weight of materials
5. total weight of load.

## **Task 3**

Demonstrate knowledge of crane documentation affecting loads

## **Performance Standards**

### **3.1 Engineer's drawings and blueprints are interpreted accurately**

Must include

1. capacity
2. boom configuration
3. load weight
4. rigging weight
5. calculations
6. radius of crane
7. positioning of crane
8. positioning of the load

- 3.2 Shipping company's bill of lading is compared to an estimated weight based on volume, LMI (Load Moment Indicator) and type of load to determine accuracy
- 3.3 Load capacity charts are interpreted accurately

## Unit Standard CLC 5.2 K

### Load Charts

### Demonstrate knowledge of loading and lifting - core

#### Purpose

This unit provides the basis for proper loading and lifting.

#### Prerequisites

Unit Standard CR 4.1 K Demonstrate knowledge of lifting theory and forces

Unit Standard CR 4.2 K Demonstrate knowledge of rigging hardware, materials and tools

Unit Standard CR 4.3K Demonstrate knowledge of types and functions of wire rope and chains

Unit Standard CR 4.5 K Demonstrate knowledge of rigging techniques

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice.

CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

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#### References

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Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### Task 1

Demonstrate knowledge to determine sufficient lifting capacity of a crane considering the configuration and attachments required for the lift.

## **Performance standards**

1.1 Fundamentals of leverage are reviewed

1.2 Optimum boom configurations are described

Must include

1. boom length
2. boom angle
3. radius
4. hook height
5. quadrant.

1.3 Configurations appropriate for lifting loads are selected

Must include

1. radius
2. parts of line
3. height of the combined load and rigging
4. weight of the combined load and rigging
5. boom length
6. boom jib combination
7. counterweight combination.

1.4 Configurations for the lifts for the crane are verified by the site supervisor and the crane supervisor

Must include

1. complete lift forms as required by company

1.5 Differences between gross load and gross capacity are described

1.6 Static and dynamic loading and lifting principles are explained

## **Task 2**

Demonstrate knowledge of selection of rigging hardware to safely lift loads in accordance with manufacturer's recommendations

## **Performance Standards**

2.1 Load configurations are accurately determined

Must include

1. calculations for rigging
2. calculations for loads

3. load chart accuracy

2.2 Load height, weight, length and width are verified with crane supervisor

Must include

1. calculations for rigging
2. calculations for loads
3. load chart accuracy

2.3 Centre of gravity for a load is accurately calculated

2.4 The safe working load (SWL / WLL) for wire rope and rigging hardware is accurately calculated and used

Must include

1. prevent overloading
2. prevent spooling

2.5 Criteria for selecting the appropriate hardware are described according to the manufacturer's requirements

Must include

1. weight
2. size of load

2.6 Criteria for selecting the appropriate safety devices are described.

Must include

1. shape
2. weight
3. sharp edges
4. round edges.

2.7 Loads on slings of equal and unequal length are accurately calculated

Must include

1. weight of load
2. centre of gravity
3. sling angles
4. dimension of the load.
  - i. height
  - ii. weight
  - iii. length.

## **Unit Standard CLC 5.3 W**

### **Load Charts**

### **Interpret load charts and load study drawings to configure crane for workplace operation - core**

#### **Purpose**

This unit allows for the demonstration of correct crane configuration based on load charts and load study drawings

#### **Prerequisites**

Unit Standards CLC 5.1 K Demonstrate knowledge of determining weight loads using fundamental math functions and calculations

Unit Standard CLC 5.2 K Demonstrate knowledge of loading and lifting

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CAN/CSA-Z150-20 Safety Code for Mobile Cranes,  
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Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

#### **Task 1**

Configure crane appropriately after accurately interpreting load charts and lift plan drawings.

## **Performance standards**

- 1.1 Load charts are interpreted accurately
- 1.2 Load dimensions are verified by crane supervisor, crane operator (and engineer as required)
- 1.3 Centre of gravity is calculated
- 1.4 Special lift instructions are followed
- 1.5 Safe working loads (SWL / WLL) for wire rope and rigging are determined
- 1.6 Appropriate hardware and safety devices are selected
- 1.7 Load on the slings is considered for equal and unequal lengths

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 8 CRANE OPERATIONS**



## **SECTION 8 – CRANE OPERATIONS**

### **Unit Standard CCO 8.1 K**

#### **Crane Operations**

#### **Demonstrate knowledge of preoperational requirements in crane operations - core**

##### **Purpose**

This unit provides the knowledge required to do a pre-operational inspection in accordance with manufacturer's recommendations

##### **Prerequisites**

All Unit Standards in Sections 1 through 7

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
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Workplace Hazardous Material Information System (WHMIS),  
and delivery agency policy

##### **Task 1**

Demonstrate knowledge of the pre-operational inspection procedures recommended for a mobile crane, a Boom truck, a tower crane and a self erect crane.

## **Performance Standards**

### **1.1 Inspection procedures are described accurately**

Must include

1. operator aids for crane in place
2. inspection and erection reports are completed
3. OH & S requirements followed
4. locate control systems and system gauges
5. according to manufacturer's requirements

### **1.2 The place, location and verification of operator aids for the crane are described**

Must include

1. the LMI
2. boom length indicator (assessment note for Tower Crane and Self Erect Crane)
3. boom angle indicator (see above 1.2 2)

### **1.3 The completion and filing of inspection and erection reports is described**

Must include

1. crane logbook
2. lift plan

## **Task 2**

Demonstrate knowledge of tests, repairs and maintenance required during the pre-operation inspection stage.

## **Performance Standards**

### **2.1 Function tests on hoist systems are described**

Must include

1. boom up
2. boom down (assessment note for Tower Crane and Self Erect Crane)
3. hoist up
4. hoist down
5. swing left

6. swing right
7. scope in (assessment note for Tower and Self Erect)
8. scope out
9. brakes

- 2.2 Repairs and maintenance prior to operation are described according to manufacturer's requirements and they are entered in the crane logbook

### **Task 3**

Demonstrate knowledge of reports and records required for reporting deficiencies or defects.

#### **Performance Standard**

- 3.1 The process of defects and deficiencies being accurately reported to the supervisor and properly documented in the crane log book is described

Must include

1. date
2. description of issue
3. signature of person doing the repairs
4. signature of the operator
5. legal requirements entries must meet WorkSafeBC regulations, corporate standards, and any other applicable regulatory agencies codes, laws and guidelines.

- 3.2 The process to ensure repairs and maintenance are recorded in the appropriate crane log book is described

Must include

1. date
2. description
3. signature of repair person

### **Task 4**

Demonstrate knowledge of the setup procedures for a mobile cranes/ boom trucks (assessment note for Tower Crane and Self Erect)

## Performance Standards

4.1 Setup procedures are accurately explained according to manufacturer's specifications

4.2 Overhead obstructions and underground hazards are described.

Must include

1. power cables
2. trees
3. underground sewers
4. underground water
5. underground building structures

4.3 The requirements for blocking and mats to be sufficient considering the load requirements and surface conditions to level the crane is described

4.4 Programming and adjusting safety devices to ensure accuracy and safety while lifting

Must include

1. LMI Load moment indicator
2. anti two block systems, high speed limits and max. height limits
3. boom angle indicators
4. level

## Unit Standard CCO 8.4 W

### Crane Operations

#### **Demonstrate safe crane set up according to manufacturer's instructions – core** (Note: Task 4 applies only to mobile cranes)

#### **Purpose**

This unit demonstrates a pre-operational inspection of a crane prior to use in accordance with manufacturer's recommendations

#### **Prerequisites**

All Knowledge Units in Sections 1 through 7.

Unit Standard CCO 8.1 K Demonstrate knowledge of pre-operational requirements in crane operations

Unit Standard CCO 8.2 K Demonstrate knowledge of crane operations to pick up and carry loads

Unit Standard CCO 8.3 K Demonstrate knowledge to leave a crane unattended

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CAN/CSA-Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS) and delivery agency policy

#### **Task 1**

Conduct pre-operational inspections as recommended for a mobile crane, a Boom truck, a tower crane and a self erect crane

## **Performance Standards**

### **1.1 Inspection procedures are accurately followed**

Must include

1. operators aids for crane in place
2. inspection and erection reports are completed
3. OH & S requirements followed
4. control systems and system gauges are located
5. manufacturer's requirements

### **1.2 Operator aids for the crane are in place, located and verified**

Must include

1. the LMI
2. boom length indicator
3. boom angle indicator

### **1.3 All inspection and erection reports are accurately completed and appropriately filed**

Must include

1. crane logbook
2. lift plan

## **Task 2**

Perform tests, repairs and maintenance required during the pre-operation inspection stage.

## **Performance Standards**

### **2.1 Perform function tests on hoist systems**

Must include

1. boom up
2. boom down
3. hoist up
4. hoist down
5. swing left

6. swing right
7. scope in
8. scope out
9. brakes

- 2.2 Perform repairs and maintenance prior to operation according to manufacturer's requirements and they are entered in the crane logbook

### **Task 3**

Complete reports and records required for reporting deficiencies or defects.

### **Performance Standard**

- 3.1 Defects and deficiencies are accurately reported to the supervisor and properly documented in the crane log book

Must include

1. date
2. description of issue
3. signature of person doing the repairs
4. signature of the operator

- 3.2 Repairs and maintenance are recorded in the appropriate crane log book

Must include

1. date
2. description of issue
3. signature of person doing the repairs

**Task 4 is part of the Advanced Program - Mobile 80 tonnes and under.**

## **CORE PROGRAM OUTLINE**

# **PROGRAM OUTLINE FOR SECTION 9 MAINTENANCE & SERVICE**



## **SECTION 9 – MAINTENANCE & SERVICE**

### **Unit Standard CMS 9.1 W**

#### **Maintenance & Service**

**Maintain an equipment logbook to retain a permanent written record of maintenance and repairs**

#### **Purpose**

This unit provides the correct use of and input to an equipment logbook for cranes.

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations and industry practice. CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/ASME B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System (WHMIS) and Delivery Agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent crane operator with Red Seal endorsement (in the case of Mobile Crane) and industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CAN/CSA-Z150-20 Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or ANSI/ASME B30.22-2016, Articulating Boom Crane, Workplace Hazardous Material Information System WHMIS and delivery Agency policy

#### **Task 1**

Record all inspections and maintenance in an equipment log book

#### **Performance Standards**

- 1.1 All entries are legible and easily understood
- 1.2 All entries are complete and accurate

- 1.3 All inspections are accurately recorded when inspection is completed
- 1.4 All requests for the external supply of maintenance are accurately recorded within
- 1.5 All maintenance performed is accurately recorded when it is completed

## **Task 2**

Report all inspections, defects, deficiencies, and maintenance to the crane supervisor and site supervisor

### **Performance Standards**

- 2.1 Communication is clear and understood
- 2.2 Reports are made at the time of the inspection, request or maintenance.

## **CORE PROGRAM OUTLINE**

# **SECTION 3**

# **TRAINING PROVIDER**

# **STANDARDS**

## TRAINING PROVIDER STANDARDS

The Crane Core Program is a Competency Based Program of Instruction. This means that the Program Outline defines the Outcomes expected of training, not the inputs, which include time.

By their nature cranes require a one-to-one ratio of student-to-crane to develop the required competence. Industry believes a crane operator becomes competent through building on his or her theoretical knowledge with real world experience.

This program is divided into theoretical and practical components.

The theoretical component is made up of the Knowledge Units, which:

- can be taught in a classroom setting by a qualified instructor (see below)
- delivered on line
- learned through self study on line or through printed materials

The practical component is made up of the Workplace Units, which:

- require hands on experience
- are assessed on the job by a Registered Workplace Assessor
- may be begun in a simulated setting such as a training yard, but are assessed for credit in the workplace

The industry is interested in the outcome of training and is looking for creative responses from the crane training community on how to best deliver training to these standards in a time efficient and cost effective manner. Industry has purposely not set minimum equipment requirements for this reason.

Past training experience in this area has shown consistent training outcomes to these standards in a wide range of times and with a variable mix of on seat equipment time vs. theory instruction time.

With these competence standards industry now has a vehicle for structuring on the job training and wishes to see trainers take advantage of the opportunity on the job training represents. For example, some ideas industry has discussed as options include:

1. Support learners on the job by bringing the trainer to the job site. Crane purchase or rental is not required by the trainer and the learner receives targeted instruction.
2. Deliver instruction in the evenings or on weekends to complement the learner's on the job experience.
3. Deliver targeted theory and practical instruction precisely geared to the standards in this outline – which will ideally guarantee a highly skilled individual to the employer who can demonstrate workplace competence in short order.

### **Instructor Qualification:**

For technical training, instructors must be occupationally competent to run the crane type they are training to, and, as a minimum, hold a crane operator's Unrestricted Proof of Competence from the BC Association for Crane Safety.

### **Minimum List of Shop/Laboratory Equipment Required for Crane Common Core**

Industry wishes to state no minimum requirement in the interest of permitting training providers maximum flexibility in the options and strategies they may employ in training to these standards, in the case of Knowledge Units, and supporting development of workplace performance in the case of Workplace Units.

## **BC CRANE OPERATOR PROGRAM OVERVIEW**

Section 14.34.1 of the OHS Regulation states: On and after July 1, 2007, a mobile crane, tower crane or boom-truck must be operated only

- a) by a person with a valid operator's certificate issued by a person acceptable to the Board, and
- b) in accordance with any conditions stipulated on the certificate by the issuing person.

Section 14.34.1 applies to operators of all mobile cranes, boom trucks, and tower cranes with a rated capacity greater than five tonnes or with a boom length greater than 8 metres.

Operator Certification/Qualification for Crane Operators in BC may be obtained to operate each of the following types of cranes:

### **Mobile Cranes**

1. Mobile Crane 80 tonnes and under
2. Mobile unlimited tonnage
3. Mobile Lattice Friction
4. Mobile Lattice Hydraulic

### **Boom Trucks**

1. Boom Folding 22 tonnes and under
2. Boom Folding unlimited tonnage
3. Boom Stiff 40 tonnes and under
4. Boom Stiff unlimited tonnage

### **Tower Cranes**

1. Tower Crane

Operator certification is granted for each crane type. A candidate may choose to undertake certification in one or two crane types only or in all crane types. Each crane type requires a course of study, on-job training and the successful completion the operator assessments for that crane type. Certification is granted according to the BC Association for Crane Safety (BCACS) Levels.

## The BCACS Levels

**Provisional Operator** means a person who has passed the theory assessment and is certified to make routine lifts with a minimum of indirect supervision, but will require hands-on, direct supervision for all first time significant lifts and all critical lifts. These lifts will be clearly documented by both the operator and the employer. Theory assessments for existing operators who choose to obtain provisional certification will be conducted by the employer. New operators will be required to pass a formal written assessment. Provisional certification is valid for one year and can be renewed up to three times. A provisional certificate will specify what type of crane the operator may operate and their employer. The Provisional Certificate is only valid while working for the identified employer on the certificate. If the operator changes employers, they must submit a change of employer form.

**Full Scope Operator** means a person who has passed both the theory and practical assessments conducted by a third-party assessor for a specific crane type. A Full-Scope Certificate will specify what type of crane the operator may operate. This certificate means that the operator is competent to safely perform all crane lifts within the scope of the identified crane type and size. The employer is not identified on this certificate.

## Assessors

**Third Party Assessor** means a person recognized by the BCACS to perform practical assessments. This person must be dedicated to assessing only and not be a trainer of crane operators or otherwise be in any other potential conflict of interest.

**Theory Assessment** means an assessment administered by the BCACS, conducted on either paper, computer, verbal or other means. These assessments will be delivered through the ITA (Industry Training Authority) and administered by the BCACS.

**Practical Assessment** means an assessment conducted by a third party assessor, and approved by the BCACS. The assessment involves spoken questions, as well as the operator using the crane to show that they have the basic knowledge, skills and ability to safely operate the crane. The operator is then considered to be **competent** (having the right skills and knowledge to operate the crane) and will receive written proof. If the operator is found **not yet competent** after performing the practical assessment they would be allowed to continue operating with a Provisional Certificate as decided by the third party assessor. An action plan and a follow-up date will be set following the completion of the assessment. The operator will be informed of this date both verbally and in writing.

## The Steps to Qualification

To become a certified crane operator in British Columbia candidates may follow one of two options:

1. Experienced crane operators who are not yet certified must challenge the certification process. Some classifications require one to three theory exams before the practical assessment can be attempted. Other classifications only require the practical assessment. Operators who are certified in another jurisdiction must apply to have their credentials recognized in British Columbia.
2. New crane operators must apply, with their employer, for a provisional certificate and work under supervision until they have met the competency and hour requirements..

Each course of study and on-job training includes:

1. A mandatory common core program for all crane types.
2. Advanced units of study in each of the individual crane types that build on the common core.

This program is divided into theoretical and practical components.

The theoretical component is made up of the Knowledge Units, which:

- may be taught in a classroom setting by a qualified instructor,
- delivered on line, or
- learned through self study on line or through printed materials

The practical component is made up of the Workplace Units, which:

- require hands on experience
- are assessed on the job by a Registered Workplace Assessor
- may be begun in a simulated setting such as a training yard, but are assessed for credit in the workplace



## RECOMMENDED REFERENCE TEXTBOOKS

**From the Construction Safety Association of Ontario** <http://www.csao.org/>

*Mobile Crane Manual*

by Donald E. Dickie, P. Eng., D. H. Campbell, P. Eng.

Construction Safety Association of Ontario ..... ISBN 0-8273-6527-6

*Rigging Manual*

by Donald E. Dickie, P. Eng.

Construction Safety Association of Ontario ..... ISBN 0-7726-1574-8

*Hoisting and Rigging Safety Manual*

Infrastructure Health & Safety Association of Ontario ISBN 13-978-0-919465-70-1

*Slings*

Construction Safety Association of Ontario ..... ISBN 0-919465-76-5

### **Safety in Rigging Video/DVD Series**

The complete set of 10 *Safety in Rigging* DVDs (FD001-FD010), complete with instructor's notes. Includes:

1. Cranes: Types, Components and Case Histories (FD001)
2. Hazard Awareness in Crane Operating Areas (FD002)
3. International Hand Signals (FD003)
4. Wire Rope (FD004)
5. Hardware (FD005)
6. Chain (FD006)
7. Slings (FD007)
8. Reeving (FD008)
9. Hoists, Winches and Related Devices (FD009)
10. Jacks, Rollers and Related Devices (FD010)

Cranes: Types, Components and Case Histories Video/DVD (set of 10)

**From the Operating Engineers Training Institute of Ontario** <http://www.oetio.com>

*Mobile Craning Today*

Operating Engineers Training Institute of Ontario ..... ISBN 0-8273-5460-6

**Additional Resources**

*IPT's Crane and Rigging Handbook*

by Ronald G. Garby .....ISBN 0-920855-14-8

*IPT's Crane and Rigging Training Manual*

By Ronald G. Garby ..... ISBN 0-920855-16-4

**Reference Authority**

**(to be developed when revised OSH regulations released in Summer 07)**

1. WorkSafeBC Occupational Health and Safety (OHS) regulations
2. WorkSafe BC Occupational First Aid Requirements
3. CAN/CSA-Z150-20 Safety Code for Mobile Cranes,
4. ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or  
ANSI/AMSE B30.22-2016, Articulating Boom Crane,
5. ANSI Standard ANSI/SIA A92.2-2001 American National Standard Vehicle-Mounted  
Elevating and Rotating Aerial Devices

**BOOM TRUCK OPERATOR FOLDING BOOM UNLIMITED TONNAGE**

**PROGRAM OUTLINE  
FOR  
SECTION 3  
  
FOLDING BOOM CRANES  
UNLIMITED TONNAGE**

## **SECTION 3 – CRANES**

### **Unit Standard AC 3.11 K**

#### **Cranes**

#### **Demonstrate knowledge of crane components and attachments for boom trucks with folding booms (unlimited tonnage)**

##### **Purpose**

Demonstrate knowledge of folding boom crane components and attachments

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices: CAN/CSA-Z150-20 Safety Code for Mobile Cranes, Z150.3-17 Safety code on articulating boom cranes

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane

Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CSA Standard Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

##### **Task 1**

Demonstrate knowledge of carriers and undercarriages.

##### **Performance standards**

- 1.1 The purpose of truck and undercarriage components are identified and explained

Must include

1. suspensions
2. wheels
3. tires
4. travel chains
5. hydraulic motors

- 1.2 Defects and malfunctions that can occur on the truck and undercarriage are described

Must include

1. cracked frame
2. cracked welds
3. broken drive line shafts
4. damaged wheels
5. damaged differentials
6. tires

## **Task 2**

Demonstrate knowledge of outrigger and stabilizing equipment

- 2.1 The functions of outrigger and stabilizing equipment are identified and explained

Must include

1. outrigger beams
2. outrigger jacks
3. outrigger pads
4. retaining pins
5. hydraulic hoses

## **Task 3**

Demonstrate knowledge of the turntable on a variety of cranes

- 3.1 Components of a turntable and turret

Must include

1. bearing
2. bolts

- 3.2 The function of turntable components are identified and explained

Must include

1. bearing

2. bolts

3.3 Defects and malfunctions of the turntable or turret components are described

Must include

1. loose bolts
2. structural cracks
3. distortions to the turntable or turret
4. damage to the turntable or turret

#### **Task 4**

Demonstrate knowledge of crane safety components, devices and aids

4.1 The safety component devices and aids and their functions for boom trucks are described

Must include

1. safety guards
2. covers
3. Load Moment Indicator (LMI)
4. anti-two block devices (when hoist is installed)  
boom length indicators
5. boom angle indicator

4.2 On-board crane operator aids and their functions are introduced and briefly described

Must include

1. load charts
2. operators' manuals
3. operator log book

4.3 Programming the Load Moment Indicator is explained

4.4 Defects or malfunctions of safety devices, components and aids are described.

Must include

1. safety guards
2. covers
3. Load Moment Indicator (LMI)
4. anti-two block devices (when hoist is installed)
5. boom length indicators
6. boom angle indicator.

4.6 Actions to take when safety devices malfunction are explained

Must include

1. report to job supervisor
2. report to crane or equipment supervisor
3. enter in logbook
4. stop or continue with appropriate precautions depending on seriousness.



## **Unit Standard AC 3.12 K**

### **Cranes**

### **Demonstrate knowledge of engines and ancillary systems on boom trucks with folding booms (unlimited tonnage)**

#### **Purpose**

Demonstrate knowledge of crane engines and ancillary systems

#### **Prerequisite**

Core Unit Standards CC 3.1 K, CC 3.2 K, CC 3.3 K and CC 3.4 K  
Unit Standard AC 3.11 K Demonstrate knowledge of crane components and attachments for boom trucks with folding booms (unlimited tonnage)

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices: CAN/CSA-Z150-20 Safety Code on Mobile Cranes, Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS), and company policy

#### **Task 1**

Demonstrate knowledge of crane engines on boom trucks.

## **Performance standards**

- 1.1 The components of electrical, diesel and gas power plants are listed and their functions described

Must include

1. block
2. piston
3. connecting rod
4. camshaft
5. fuel injectors
6. fuel pumps
7. limit switches.

- 1.2 Defects or malfunctions of power plants are described for components

Must include

1. block
2. piston
3. connecting rod
4. camshaft
5. fuel injectors
6. fuel pumps
7. limit switches.

## **Task 2**

Demonstrate knowledge of crane drive systems for boom trucks.

## **Performance standards**

- 2.1 The components of the drive system are explained and their functions described

Must include

1. clutch
2. transmission
3. differentials
4. power take-offs
5. hydraulic motors

- 2.2 Defects or malfunctions of drive system components are described

Must include

## Folding Boom Crane Operator Standards Unlimited Tonnage

1. clutch
2. transmission
3. differentials
4. power take-offs
5. hydraulic motors

## Unit Standard AC 3.13 K

### Cranes

### Demonstrate knowledge of power transfer for boom trucks with folding booms (unlimited tonnage)

#### Purpose

Demonstrate knowledge of power transfer including pneumatic, hydraulic, electrical, steering and braking.

#### Prerequisite

Core Unit Standards CC 3.1 K, CC 3.2 K, CC 3.3 K and CC 3.4 K  
Unit Standard AC 3.11 K Demonstrate knowledge of crane components and attachments for boom trucks with folding booms (unlimited tonnage)  
Unit Standard AC 3.12 K Demonstrate knowledge of engines and ancillary systems for boom trucks with folding booms (unlimited tonnage)

#### Assessment

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices: CAN/CSA-Z150-20 Safety Code on Mobile Cranes, Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS) and delivery agency policy.

#### Quality Assurance

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

#### References

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

## **Task 1**

Demonstrate knowledge of pneumatic systems in crane operations.

### **Performance standards**

#### **1.1 Components of pneumatic systems are described and their functions explained**

Must include

1. air brakes
2. horn
3. seats
4. air control levers.

#### **1.2 Defects or malfunctions of pneumatic systems are described**

Must include

1. air brakes
2. horn
3. seats
4. air control levers.

## **Task 2**

Demonstrate knowledge of hydraulic systems in crane operations.

### **Performance standards**

#### **2.1 Components of hydraulic systems are described and their functions explained**

Must include

1. hydraulic fluid
2. filters
3. lines
4. pumps
5. motors
6. fittings
7. hydraulic control levers.

#### **2.2 Defects or malfunctions of pneumatic systems are described .**

Must include

1. hydraulic fluid
2. filters
3. lines
4. pumps
5. motors

6. fittings
7. hydraulic control levers.

### **Task 3**

Demonstrate knowledge of electrical systems in boom crane operations.

#### **Performance standards**

- 3.1 Components of electrical systems are described and their functions explained

Must include

1. alternator
2. starter
3. regulator
4. wiring
5. fuses
6. generator
7. limit switches

- 3.2 Defects or malfunctions of electrical systems are described .

Must include

1. alternator
2. starter
3. regulator
4. wiring
5. fuses
6. generator
7. limit switches.

### **Task 4**

Demonstrate knowledge of steering system components in boom crane operations.

#### **Performance standards**

- 4.1 Components of steering systems are described and their functions explained

Must include

1. axles
2. tie rods
3. steering box
4. sliding jaw clutch
5. ball joints
6. walking beam

4.2 Defects or malfunctions of steering systems are described

Must include

1. axles
2. tie rods
3. steering box
4. sliding jaw clutch
5. ball joints
6. walking beam

**Task 5**

Demonstrate knowledge of travel braking systems in boom crane operations.

**Performance standards**

5.1 Components of the braking systems are described and their functions explained

Must include

6. air compressor
7. brake chambers
8. drums
9. brake bands
10. slack adjusters

5.2 Defects or malfunctions of braking systems are described

Must include

6. air compressors
7. brake chambers
8. drums
9. brake bands
10. slack adjusters

# **PROGRAM OUTLINE FOR SECTION 6 TRANSPORTATION & DELIVERY**



## **SECTION 6 – TRANSPORTATION & DELIVERY**

### **Unit Standard ATD 6.8 K**

#### **Transportation & Delivery**

**Demonstrate knowledge of the BC Ministry of Transportation – Commercial Transport rules and regulations as they pertain to highway transportation of boom trucks with folding booms (unlimited tonnage)**

#### **Purpose**

This unit provides the knowledge required to transport a crane in accordance with the BC Ministry of Transportation – Commercial Transport regulations.

#### **Prerequisites**

Unit Standard CC 3.1 K Demonstrate knowledge of types of cranes and classifications  
Unit Standard AC 3.9 K Demonstrate knowledge of components and attachments for boom trucks with folding cranes (unlimited tonnage)

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)  
Insurance Corporation of BC (ICBC) and delivery agency policy.

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS)  
Insurance Corporation of BC (ICBC)

BC Ministry of Transportation – Commercial Transport regulations and delivery agency policy  
Commercial Vehicle Safety Enforcement

### **Task 1**

Demonstrate knowledge of legislation and regulations to drive a boom truck with a folding boom on public highways according to the BC Ministry of Transportation - Commercial Transport Regulations

### **Performance standards**

- 1.1 Related sections of the BC Ministry of Transportation - Commercial Transport Regulations are located and explained for the travel and transportation of boom trucks.,
- 1.2 Criteria for special permits for travel or transportation of a boom truck on a public highway are described

Must include

1. overall height
2. overall weight
3. overall length
4. total axle weight

## **Unit Standard ATD 6.9 K**

### **Transportation & Delivery**

#### **Demonstrate knowledge to prepare a boom truck with a folding boom (unlimited tonnage) for highway/road travel**

##### **Purpose**

This unit provides the knowledge to prepare a boom truck with a folding boom (unlimited tonnage) for travel to a worksite

##### **Prerequisites**

Unit Standard CC 3.1 K Demonstrate knowledge of types of cranes and classifications

Unit Standard ATD 6.8 K Demonstrate knowledge of the BC Ministry of Transportation - Commercial Transport Regulations, as they pertain to the transportation of cranes

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:

CAN/CSA-Z150-98 20 Safety Code on Mobile Cranes,

Z150.3 -17 Safety code on articulating boom cranes

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE

B30.22-2016, Articulating Boom Crane

Workplace Hazardous Material Information System (WHMIS)

Insurance Corporation of BC (ICBC) and delivery agency policy.

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CSA Standard Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE

B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS),

Insurance Corporation of BC (ICBC)

BC Ministry of Transportation – Commercial Transport regulations and delivery agency policy

## **Task 1**

Demonstrate knowledge to prepare a boom truck with a folding boom (unlimited tonnage) and its components for highway travel in accordance with manufacturer's recommendations and the BC Ministry of Transportation - Commercial Transport Regulations.

### **Performance standards**

- 1.1 The requirements to drive a boom truck with a folding boom (unlimited tonnage) and its components on public highways are explained

Must include

1. ramps
2. decking
3. 2 pieces of planking (for outriggers)
4. flags
5. lights
6. permits
7. wheel chocks

- 1.2 The procedure for correctly preparing the boom truck with a folding boom (unlimited tonnage) and its components for driving are explained.

Must include

1. retract the boom
2. apply swing brake and lock
3. secure hook to tie down
4. retract and pin outrigger beam
5. remove outrigger pads

- 1.3 Requirements to safely secure the boom truck with a folding boom (unlimited tonnage) and its components displaying correct and serviceable signage and signals are explained.

Must include

1. manufacturer's procedures
2. BC Ministry of Transportation - Commercial Transport Regulations
3. flags
4. flashers
5. warning signs.

- 1.4 Verification of permits for the boom truck with a folding boom (unlimited tonnage) and its load are explained.

Must include

1. correct permit present for boom truck and load being transported where applicable.

# **PROGRAM OUTLINE FOR SECTION 7**

## **SITE PLANNING & CRANE POSITIONING**

## **SECTION 7 – SITE PLANNING & CRANE POSITIONING**

### **Unit Standard ASPCP 7.6 K**

#### **Site Planning & Crane Positioning**

**Demonstrate knowledge to locate and safely position a boom truck with a folding boom (unlimited tonnage) using site assessment tools**

##### **Purpose**

This unit provides the knowledge required to use lift plans and to assess a site accurately in order to set-up and operate a Boom Truck with folding boom crane (unlimited tonnage).

##### **Prerequisite**

Unit Standard CLC 5.2 K Demonstrate knowledge of loading and lifting

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

### **Task 1**

Demonstrate knowledge of lift plans (left in until it can be verified if this is or is not relevant to Boom Trucks)

#### **Performance standards**

- 1.1 The purpose of site blue prints and engineering drawings in preparing lift plans is explained

Must include

- structural integrity of the area
- placement of load
- placement of crane

- 1.2 The elements of a standard lift plan are described

Must include

- routine to move load
- signal person
- radio/hand signals
- signed by operator
- signed by supervisor

### **Task 2**

Demonstrate knowledge of how to assess a site to safely position a boom truck and perform the required lift(s).

#### **Performance standards**

- 2.1 Examining the site.

Must include

- structural integrity of the area
- placement of load
- placement of Boom Truck and crane set up
- proximity to slopes
- proximity to excavations
- ground stability and drainage



## 2.2 Planning the lift

Must include

- routine to move load
- signal person
- radio/hand signals
- signed by operator (where appropriate)
- signed by supervisor (where appropriate)

## **Unit Standard ASPCP 7.7 W**

### **Site Planning & Crane Positioning**

#### **Conduct an accurate site assessment and safely position a boom truck with a folding boom (unlimited tonnage) in the workplace**

##### **Purpose**

This unit provides the knowledge required to locate and safely position a boom truck with folding boom.

##### **Prerequisite**

ASPCP 7.6 K Demonstrate knowledge to locate and safely position a boom truck with a folding boom (unlimited tonnage) using site assessment tools

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009  
CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

##### **Task 1**

Inspect a site and develop an accurate lift plan

## **Performance Standards**

### **1.1 Lift plan is accurate**

#### **Must include**

1. assessment of area and soil condition
2. assessment of hazards
3. assessment of obstacles
4. overhead hazards
5. underground utilities
6. proximity to slopes
7. proximity to excavations
8. ground stability and drainage

### **1.2 Location and positioning of Boom Truck and crane boom is safe and correct**

#### **Must include**

1. blocking and blocking mats
2. signalling and barrier signage
3. grounding and bonding

# **PROGRAM OUTLINE FOR SECTION 8 CRANE OPERATIONS**

## **SECTION 8 – CRANE OPERATIONS**

### **Unit Standard ACO 8.9 K**

#### **Crane Operations**

#### **Demonstrate knowledge of crane operations for a boom truck with a folding boom (unlimited tonnage)**

##### **Purpose**

This unit provides the knowledge required to operate a boom truck with a folding boom (unlimited tonnage) to lift and place loads in a safe and efficient manner in accordance with the manufacturer's recommendations.

##### **Prerequisites**

All Knowledge Units in Core and Advanced Sections 1 through 7 are required.

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:

CAN/CSA-Z150-20 Safety Code on Mobile Cranes,

Z150.3 -17 Safety code on articulating boom cranes

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane

Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or

ANSI/ASME B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System WHMIS and delivery Agency policy

### **Task 1**

Demonstrate knowledge of the use of the appropriate load charts for articulating boom cranes.

#### **Performance standards**

- 1.1 Load charts are interpreted accurately
- 1.2 Load dimensions are verified by crane supervisor, crane operator (and engineer as required)
- 1.3 Centre of gravity is calculated
- 1.4 Special lift instructions are noted
- 1.5 Safe working loads (SWL / WLL) for wire rope and rigging are determined
- 1.6 Appropriate hardware and safety devices are selected
- 1.7 Load on the slings is considered for equal and unequal lengths (when used)

### **Task 2**

Demonstrate knowledge to correctly operate a folding boom crane without and with a load

#### **Performance Standards**

- 2.1 The safe and correct operation of a folding boom crane without a load is described

Must include

- 1. Booming up and booming down
- 2. telescoping in and out (when equipped with telescoping boom section)
- 3. slewing (swinging) clockwise and counter clockwise
- 4. hoisting up and down (when equipped with hoist)

2.2 The safe and correct operation of a folding boom crane with a load is described

Must include

1. Booming up and booming down
2. telescoping in and out (when equipped with telescoping boom section)
3. slewing (swinging) clockwise and counter clockwise
4. hoisting up and down (when equipped with hoist)

**Task 3**

Demonstrate knowledge of safe control of the load according to conditions.

**Performance Standard**

3.1 Weather conditions and their affects on lifting are listed

Must include

1. ice
2. frozen to the ground
3. high winds
4. lightning storm

3.2 Techniques to maintain control of the hook (and block when equipped with a hoist) are described

Must include

1. maintain even control
2. use slower swing speeds
3. awareness of the effect of slewing speed on load and boom swing radius

**Task 4**

Demonstrate knowledge of hoisting procedures for a boom truck with a folding boom 22 tonnes and under.

**Performance Standard**

4.1 Procedures for operating in the vicinity of high voltage equipment are described according to local utilities and limits of approach

4.2 The procedures for doing a blind lift are explained.

Must include

1. use of radio when signaller not visible

### **Task 5**

Demonstrate knowledge of the monitoring and troubleshooting required while operating a folding boom crane

5.1 Monitoring equipment performance during operation is described

Must include

1. water levels
2. oil fluid levels
3. hydraulic levels
4. instrument gauges

5.2 How to trouble shoot equipment problems is described according to manufacturer's specifications

### **Task 6**

Demonstrate knowledge of safely and efficiently moving and placing a load at its intended destination

6.1 Moving and placing a load safely is described

Must include

1. obey signal person
2. avoid all obstacles
3. load is in the right destination

### **Task 7**

Demonstrate knowledge of post operational procedure

Must include

1. check fluid levels
2. proper shut down of engine
3. proper lockup
4. leave in appropriate location



## **Unit Standard ACO 8.10 W**

### **Crane Operations**

#### **Operate a boom truck with a folding boom (unlimited tonnage) to safely lift and place loads in a workplace**

##### **Purpose**

This unit demonstrates the operation of boom truck with a folding boom (unlimited tonnage) to lift and place loads in a safe and efficient manner in accordance with the manufacturer's recommendations.

##### **Prerequisites**

Unit Standards in Sections 1 through 7

Unit Standard CCO 8.1 K Demonstrate knowledge of pre-operational requirements in crane operations

Unit Standard ACO 8.9 K Demonstrate knowledge of pre-operational requirements in crane operations for a boom truck with a folding boom (unlimited tonnage).

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:

CAN/CSA-Z150-20 Safety Code on Mobile Cranes,

Z150.3 -17 Safety code on articulating boom cranes

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane

Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations

The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009

CSA Standard Z150-20 Safety Code for Mobile Cranes,

ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,

Workplace Hazardous Material Information System (WHMIS), and delivery agency policy

## **Task 1**

Correctly operate the boom crane with and without a load according to manufacturer's specifications.

### **Performance Standards**

#### **1.1 A crane without a load is safely and correctly operated**

Must include

1. Booming up and booming down
2. Slewing clockwise and counter clockwise
3. Hoisting up and down when equipped with hoist
4. Travel to site prior to set up

#### **1.2 A crane with a load is safely and correctly operated**

Must include

1. Booming up and booming down
2. Slewing clockwise and counter clockwise
3. Hoisting up and down when equipped with hoist (and hook block when equipped with a winch).

## **Task 2**

Adjust procedures according to conditions and maintain safe control of the hook. (and hook block when equipped with a winch).

### **Performance Standard**

#### **2.1 Adjustments for weather conditions are performed (may be performed in a simulated environment)**

Must include

1. ice
2. frozen to the ground
3. high winds
4. lightning storm

#### **2.2 Techniques to maintain control of the hook are demonstrated**

Must include

1. maintain even control

2. use slower swing speeds

### **Task 3**

Perform equipped lift using a boom truck with a folding boom following manufacturer's recommendations and following all safety regulations.

#### **Performance Standard**

- 3.1 Operating in the vicinity of high voltage equipment is safely demonstrated according to local utilities and limits of approach in a simulated environment

- 3.2 A blind lift is safely performed

Must include

1. use of radio when signaller not visible

### **Task 4**

Monitor equipment performance and trouble shoot problems while using a crane.

- 4.1 Monitoring equipment performance is demonstrated

Must include

1. water levels
2. oil fluid levels
3. hydraulic levels
4. instrument gauges

- 4.2 Trouble shooting equipment problems is demonstrated according to manufacturer's specifications

### **Task 5**

Safely and efficiently lift and place loads at their intended destination

- 5.1 Load is lifted and placed safely

Must include

1. obey signal person
2. avoid all obstacles
3. load is in the right destination

### **Task 6**

Perform post operational procedures

**Performance Standards**

- 6.1      Wheels and attachments are cleaned
- 6.2      Equipment is in the appropriate location and safely parked
- 6.3      Equipment is correctly shut down
- 6.4      Equipment is safely secured

Must include

- 1. lock up
- 2. battery disconnect (switch)

- 6.5      Housekeeping tasks are performed

Must include

- 1. deck is clean
- 2. cab is clean
- 3. rubbish/obstacles in cab are removed

- 6.6      Post operation inspection is performed

Must include

- 1. fluid levels
- 2. shut down
- 3. lock up
- 4. appropriate location

# **PROGRAM OUTLINE FOR SECTION 9 MAINTENANCE & SERVICE**

## **SECTION 9 – MAINTENANCE & SERVICE**

### **Unit Standard AMS 9.13 K**

#### **Maintenance & Service**

**Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems for boom trucks with folding booms (unlimited tonnage)**

#### **Purpose**

This unit provides the knowledge required to inspect engines, monitoring devices and hydraulic systems on boom trucks equipped with folding booms (unlimited tonnage).

#### **Prerequisites**

All Unit Standards in Core Sections 1, 2, 3, 4 and 9

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or  
ANSI/ASME B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System WHMIS and delivery Agency policy

**Note:** The completion of Core Unit CMS 9.1 W is achieved naturally while completing the Advanced Units in Section 9 on Maintenance and Service.

### **Task 1**

Demonstrate knowledge of tools required to perform basic maintenance.

#### **Performance Standards**

1.1 The tools required for basic crane maintenance and their functions are described.

Must include

1. grease gun
2. wrenches
3. screwdrivers
4. hammers
5. vice grips
6. shovels
7. pinch bar
8. step ladder
9. tape measure (fibreglass or cloth)

### **Task 2**

Demonstrate knowledge of inspecting engines on boom trucks.

#### **Performance Standards**

2.1 Engine inspections are correctly described

Must include

1. crank case oil
2. air filters and cleaner
3. radiator levels and coolant systems
4. air dryer systems

### **Task 3**

Demonstrate knowledge of inspecting monitoring devices on boom trucks.

#### **Performance Standard**

3.1 Inspecting monitoring devices is accurately described

Must include

1. Load moment indicator (LMI) (when equipped)

2. anti two block device (when hoist equipped)

#### **Task 4**

Demonstrate knowledge of inspecting hydraulic systems on boom trucks.

#### **Performance Standard**

- 4.1 Safety precautions to take while performing inspections are described

Must include

1. discharge of pressure in system
2. avoiding oil being injected into the bloodstream
3. shut down of motor
4. avoiding burns and scalds

- 4.2 Inspecting hydraulic systems is accurately described

Must include

1. pumps
2. fluid levels
3. hoses
4. motors
5. valves



## **Unit Standard AMS 9.14 K**

### **Maintenance & Service**

#### **Demonstrate knowledge of servicing and maintenance procedures on procedures on boom trucks with folding booms (unlimited tonnage)**

##### **Purpose**

This unit provides the knowledge required to perform service and maintenance on boom trucks with folding booms (unlimited tonnage).

##### **Prerequisites**

Unit Standard AMS 9.13 Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or  
ANSI/ASME B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System WHMIS and delivery Agency policy

##### **Task 1**

Demonstrate knowledge of engine cooling system maintenance information from manufacturer's manuals.

## **Performance Standards**

- 1.1 Use and interpretation of manufacturer's manuals is described

### **Task 2**

Demonstrate knowledge of service and maintenance performed on boom trucks with folding booms (unlimited tonnage)

## **Performance Standards**

- 2.1 Basic service and maintenance of engines is described

Must include

1. grease fittings
2. addition of required fluids
3. adjustment of belts
4. replacement of belts
5. adjustment of air cleaners
6. oil and filter change
7. hoses

- 2.2 Adjustment of control mechanisms is explained

Must include

1. cables
2. brakes
3. levers

- 2.3 Structural maintenance is described

Must include

1. bolts
2. wedges
3. cotter keys
4. pins
5. guard rails

- 2.4 Cleaning boom truck components is described

Must include

1. batteries
2. windows
3. wheels
4. deck

2.5 Service and maintenance to boom truck and folding boom crane and accessory systems is described

Must include

1. gearbox
2. hydraulic tank breathers
3. outriggers and stabilizers
4. booms
5. steering systems
6. air tanks
7. filters

2.6 Maintenance of cooling systems is described

Must include

1. air cooling systems
2. water cooling systems

**Task 3**

Demonstrate knowledge of factors influencing operator's maintenance responsibilities

**Performance Standards**

3.1 Factors influencing operator's maintenance responsibilities are explained

Must include

1. operator's responsibility according to industry
2. operator's capabilities
3. tool availability
4. availability of higher level maintenance
5. location

## **Task 4**

Demonstrate knowledge of reporting and recording procedures for boom truck crane service and maintenance.

### **Performance Standards**

- 4.1 Reporting defects and deficiencies to the crane and site supervisors is explained
- 4.2 Recording maintenance in the log book is explained

Must include

- 1. maintenance requested
- 2. maintenance performed
- 3. legal requirements for entries

## **Unit Standard AMS 9.15 W**

### **Maintenance & Service**

#### **Complete maintenance checklists (engine on/engine off) and maintain engines on a boom truck with a folding boom (unlimited tonnage) to manufacturer's specifications**

##### **Purpose**

This unit provides the demonstration of engine maintenance according to manufacturer's specifications.

##### **Prerequisites**

Unit Standard AMS 9.13 K Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)  
Unit Standard AMS 9.14 K Demonstrate knowledge of servicing and maintenance procedures on boom trucks with folding booms (unlimited tonnage)

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or  
ANSI/ASME B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System WHMIS and delivery Agency policy

### **Task 1**

Complete maintenance engine checklists while the engine is OFF

#### **Performance Standards**

- 1.1 All parts of the checklist are accurately checked according to the company's requirements and manufacturer's manuals
- 1.2 Problems are accurately identified
- 1.3 Identified problems are recorded in the maintenance log book
- 1.4 Identified problems are reported to the crane superintendent

### **Task 2**

Complete maintenance engine checklists while the engine is ON

#### **Performance Standards**

- 2.1 All parts of the checklist are accurately checked according to the company's requirements
- 2.2 Problems are accurately identified
- 2.3 Identified problems are recorded in the maintenance log book
- 2.4 Identified problems are reported to the crane superintendent

### **Task 3**

Maintain engines to the manufacturer's specifications

#### **Performance Standards**

- 3.1 Basic service and maintenance of boom truck engines is performed

Must include

- 1. addition of required fluids
- 2. adjustment of belts
- 3. replacement of belts

4. air cleaners
5. oil filters
6. hoses

3.2 Manufacturer's manuals are interpreted accurately to determine maintenance requirements

3.3 The tools required for basic boom truck maintenance are correctly used.

Must include

1. grease gun
2. wrenches
3. screwdrivers
4. hammers
5. vice grips
6. pinch bar
7. step ladder
8. tape measure (cloth or fibreglass)

3.4 Structural maintenance is performed

Must include

1. bolts
2. wedges
3. cotter keys
4. pins
5. guard rails

3.5 Service and maintenance to boom truck and accessory systems is performed

Must include

1. gearbox
2. hydraulic tank breathers
3. outriggers and stabilizers
4. booms
5. steering systems
6. air tanks
7. filters

3.6 Cleaning boom truck components is performed

Must include

- batteries
- windows
- wheels
- deck



## **Unit Standard AMS 9.16 W**

### **Maintenance & Service**

#### **Perform routine inspections and maintenance on hydraulic systems on boom trucks with folding booms (unlimited tonnage)**

##### **Purpose**

This unit provides the demonstration of routine maintenance on hydraulic systems on boom trucks with folding booms (unlimited tonnage)

##### **Prerequisites**

Unit Standard AMS 9.13 K Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)  
Unit Standard AMS 9.14 K Demonstrate knowledge of servicing and maintenance procedures on boom trucks with folding booms (unlimited tonnage)

##### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

##### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

##### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or  
ANSI/ASME B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System WHMIS  
And delivery Agency policy

## **Task 1**

Perform routine inspections and maintenance of hydraulic systems on boom trucks with folding booms (unlimited tonnage)

### **Performance Standard**

1.1 Inspection of hydraulic systems is accurately performed

Must include

1. pumps
2. fluid levels
3. hoses
4. motors

1.2 Maintenance of hydraulic systems is safely and correctly performed

## **Unit Standard AMS 9.17 W**

### **Maintenance & Service**

### **Inspect monitoring devices and control mechanisms on boom trucks with folding booms (unlimited tonnage)**

#### **Purpose**

This unit provides the demonstration of inspection of monitoring devices and control mechanisms on boom trucks with folding booms (unlimited tonnage)

#### **Prerequisites**

Unit Standard AMS 9.13 K Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems on boom trucks with folding booms (unlimited tonnage)  
Unit Standard AMS 9.14 K Demonstrate knowledge of servicing and maintenance procedures on boom trucks with folding booms (unlimited tonnage)

#### **Assessment**

For assessment purposes, all explanations, descriptions, and activities must comply with current legislation, including WorkSafeBC regulations, and industry practices:  
CAN/CSA-Z150-20 Safety Code on Mobile Cranes,  
Z150.3 -17 Safety code on articulating boom cranes  
ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane  
Workplace Hazardous Material Information System (WHMIS)

#### **Quality Assurance**

Any assessor assessing against this competency standard must be an occupationally competent Boom Truck mounted crane operator with industrial experience; and have completed the assessor registration competency.

#### **References**

WorkSafeBC Occupational Health and Safety (OHS) regulations  
The Hoisting and Rigging Safety Manual, Infrastructure Health & Safety Association of Ontario, 2009 CSA Standard Z150-20 Safety Code for Mobile Cranes,  
ANSI Standard ANSI/ASME B 30.5-2021, Mobile and Locomotive Crane or  
ANSI/ASME B30.22-2016, Articulating Boom Crane,  
Workplace Hazardous Material Information System WHMIS and delivery Agency policy

### **Task 1**

Inspect monitoring devices on boom trucks with folding booms (unlimited tonnage) according to manufacturer's specifications and company requirements

#### **Performance Standard**

1.1 Inspection of monitoring devices is accurately performed

Must include

1. Load moment indicator (LMI) (when equipped)
2. anti two block device (when equipped with hoist)

1.2 Maintenance of monitoring systems is safely and correctly performed

### **Task 2**

Inspect control mechanisms on boom trucks with folding booms (unlimited tonnage) according to manufacturer's specifications and company requirements

2.1 Control mechanisms are accurately inspected

2.2 Adjustment of control mechanisms is performed

Must include

1. cables
2. brakes
3. levers

# **TRAINING PROVIDER STANDARDS**

## TRAINING PROVIDER STANDARDS

The BC Crane Operator: Boom Trucks with Folding Booms (unlimited tonnage) program is a Competency-Based Program of Instruction building on a mandatory Core Program of Instruction. This means that the Program Outline defines the Outcomes expected of training, not the inputs, which include time.

By their nature cranes require a one-to-one ratio of student-to-crane to develop the required competence. Industry believes a crane operator becomes competent through building on his or her theoretical knowledge with real world experience.

This program is divided into theoretical and practical components.

The theoretical component is made up of the Knowledge Units, which:

- can be taught in a classroom setting by a qualified instructor (see below)
- delivered on line
- learned through self study on line or through printed materials

The practical component is made up of the Workplace Units, which:

- require hands on experience
- are assessed on the job by a Registered Workplace Assessor
- may be begun in a simulated setting such as a training yard, but are assessed for credit in the workplace

The industry is interested in the outcome of training and is looking for creative responses from the crane training community on how to best deliver training to these standards in a time efficient and cost effective manner. Industry has purposely not set minimum equipment requirements for this reason.

Past training experience in this area has shown consistent training outcomes to these standards in a wide range of times and with a variable mix of on seat equipment time vs. theory instruction time.

With these competence standards industry now has a vehicle for structuring on the job training and wishes to see trainers take advantage of the opportunity on the job training represents. For example, some ideas industry has discussed as options include :

1. Support learners on the job by bringing the trainer to the job site. Crane purchase or rental is not required by the trainer and the learner receives targeted instruction.
2. Deliver instruction in the evenings or on weekends to complement the learner's on the job experience.
3. Deliver targeted theory and practical instruction precisely geared to the standards in this outline – which will ideally guarantee a highly skilled

individual to the employer who can demonstrate workplace competence in short order.

**Instructor Qualification:**

For technical training, instructors must be occupationally competent to run the crane type they are training to, and, as a minimum, hold full scope certification for the crane type they are training to.

**Minimum List of Shop/Laboratory Equipment Required for on Boom Trucks with Folding Booms (unlimited tonnage)**

Industry wishes to state no minimum requirement in the interest of permitting training providers maximum flexibility in the options and strategies they may employ in training to these standards.

## BC CRANE OPERATOR PROGRAM OVERVIEW

Section 14.34.1 of the OHS Regulation states: On and after July 1, 2007, a mobile crane, tower crane or boom-truck must be operated only

- c) by a person with a valid operator's certificate issued by a person acceptable to the Board, and
- d) in accordance with any conditions stipulated on the certificate by the issuing person.

Section 14.34.1 applies to operators of all mobile cranes, boom trucks, and tower cranes with a rated capacity greater than five tonnes or with a boom length greater than 8 metres.

Operator Certification/Qualification for Crane Operators in BC may be obtained to operate each of the following types of cranes:

### Mobile Cranes

1. Hydraulic Mobile Crane 20 tonnes and under
2. Hydraulic Mobile Crane 80 tonnes and under
3. Mobile unlimited tonnage (Mobile Crane as per 2017 Harmonization)
4. Mobile Lattice Friction (Mobile Crane as per 2017 Harmonization)
5. Mobile Lattice Hydraulic (Mobile Crane as per 2017 Harmonization)

### Boom Trucks

1. Folding Boom 10 tonnes and under
2. Folding Boom 22 tonnes and under
3. Folding Boom unlimited tonnage
4. Stiff Boom 20 tonnes and under
5. Stiff Boom 40 tonnes and under
6. Stiff Boom unlimited tonnage

### Tower Cranes

1. Tower Crane
2. Self-Erect Tower Crane

Operator certification is granted for each crane type. A candidate may choose to undertake certification in one or two crane types only or in all crane types. Each crane type requires a course of study, on-job training and the successful completion the operator assessments for that crane type. Certification is granted according to the BC Association for Crane Safety (BCACS) Levels.



## The BCACS Levels <sup>2</sup>

**Provisional Operator** means a person who has passed the theory assessment and is certified to make routine lifts with a minimum of indirect supervision. but will require hands-on, direct supervision for all first time significant lifts and all critical lifts. These lifts will be clearly documented by both the operator and the employer. Theory assessments for existing operators who choose to obtain provisional certification will be conducted by the employer. New operators will be required to pass a formal written assessment. Provisional certification is valid for one year and can be renewed up to three times. A provisional certificate will specify what type of crane the operator may operate and their employer. The Provisional Certificate is only valid while working for the identified employer on the certificate. If the operator changes employers, they must submit a change of employer form.

**Full Scope Operator** means a person who has passed both the theory and practical assessments conducted by a third-party assessor for a specific crane type. A Full-Scope Certificate will specify what type of crane the operator may operate. This certificate means that the operator is competent to safely perform all crane lifts within the scope of the identified crane type and size. The employer is not identified on this certificate.

## Assessors

**Third Party Assessor** means a person recognized by the BCACS to perform practical assessments. This person must be dedicated to assessing only and not be a trainer of crane operators or otherwise be in any other potential conflict of interest.

**Theory Assessment** means an assessment administered by the BCACS, conducted on either paper, computer, verbal or other means. These assessments will be delivered through the ITA (Industry Training Authority) and administered by the BCACS.

**Practical Assessment** means an assessment conducted by a third party assessor, and approved by the BCACS. The assessment involves spoken questions, as well as the operator using the crane to show that they have the basic knowledge, skills and ability to safely operate the crane. The operator is then considered to be **competent** (having the right skills and knowledge of the crane) and will receive written proof. If the operator is found **not yet competent** after performing the practical assessment they would be allowed to continue operating with a Provisional Certificate as decided by the third party assessor. An action plan and a follow-up date will be set following the completion of the assessment. The operator will be informed of this date both verbally and in writing.

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<sup>2</sup> From <http://www.bcacs.ca/levels.html>

### **The Steps to Qualification**

To become a certified crane operator in British Columbia candidates may follow one of two options:

1. Experienced crane operators who are not yet certified, must challenge the certification process. Some classifications require one to three theory exams before the practical assessment can be attempted. Other classifications only require the practical assessment. Operators who are certified in another jurisdiction must apply to BCACS to have their credentials recognized in British Columbia.
2. New crane operators must apply, with their employer, for a provisional certificate and work under supervision until they have met the competency and hour requirements.

Each course of study and on-job training includes:

1. A mandatory common core program for all crane types.
2. Advanced units of study in each of the individual crane types that build on the common core.

This program is divided into theoretical and practical components.

The theoretical component is made up of the Knowledge Units, which:

- may be taught in a classroom setting by a qualified instructor,
- delivered on line, or
- learned through self study on line or through printed materials

The practical component is made up of the Workplace Units, which:

- require hands on experience
- are assessed on the job by a Registered Workplace Assessor
- may be begun in a simulated setting such as a training yard, but are assessed for credit in the workplace



## Recommended Reference Textbooks, Video/DVD Resources

From the Construction Safety Association of Ontario <http://www.csao.org/>

*Mobile Crane Manual*

by Donald E. Dickie, P. Eng., D. H. Campbell, P. Eng.

Construction Safety Association of Ontario ..... ISBN 0-8273-6527-6

*Rigging Manual*

by Donald E. Dickie, P. Eng.

Construction Safety Association of Ontario ..... ISBN 0-7726-1574-8

*Hoisting and Rigging Safety Manual*

Infrastructure Health & Safety Association of Ontario ..... ISBN-13: 978-0-919465-70-1

*Slings*

Construction Safety Association of Ontario ..... ISBN 0-919465-76-5

### VIDEO/DVD

#### Safety in Rigging Video/DVD Series

The complete set of 10 *Safety in Rigging* DVDs (FD001-FD010), complete with instructor's notes. Includes:

11. Cranes: Types, Components and Case Histories (FD001)
12. Hazard Awareness in Crane Operating Areas (FD002)
13. International Hand Signals (FD003)
14. Wire Rope (FD004)
15. Hardware (FD005)
16. Chain (FD006)
17. Slings (FD007)
18. Reeving (FD008)
19. Hoists, Winches and Related Devices (FD009)
20. Jacks, Rollers and Related Devices (FD010)

#### Cranes: Types, Components and Case Histories Video/DVD (set of 10)

From the Operating Engineers Training Institute of Ontario <http://www.oetio.com>

*Mobile Craning Today*

Operating Engineers Training Institute of Ontario ..... ISBN 0-8273-5460-6

**Additional Resources**

*IPT's Crane and Rigging Handbook*  
by Ronald G. Garby .....ISBN 0-920855-14-8

*IPT's Crane and Rigging Training Manual*  
By Ronald G. Garby .....ISBN 0-920855-16-4

## Reference Authority

6. WorkSafeBC Occupational Health and Safety (OHS) regulations
7. WorkSafe BC Occupational First Aid Requirements
8. CSA Standard Z150-20 Safety Code for Mobile Cranes,
9. ANSI Standard ANSI/ASME B30.5-2021, Mobile and Locomotive Crane or ANSI/AMSE B30.22-2016, Articulating Boom Crane,
10. ANSI Standard ANSI/SIA A92.2-2001 American National Standard Vehicle-Mounted Elevating and Rotating Aerial Devices



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