BC Crane Operator Qualification Core Program Outline

Rebranded Dec 2024

BC Crane Safety

Crane Certification and Licensing Authority

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FOREWORD

This Program Outline is for use in guiding competency-based training of crane operators who operate Boom Trucks, Mobile Cranes - both wheeled and crawler - as well as Tower Cranes, including Self Erect Cranes.

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 Core 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.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations 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.

DEVELOPMENT OF THE UNIT STANDARDS

These Unit Standards were developed through extensive consultation with a broad cross section of stakeholders in BC's 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 Crane 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 Under 80 tonnes
   b) Mobile Unlimited tonnage
   c) Mobile Lattice Friction
   d) Mobile Lattice Hydraulic

2) Boom Cranes
   a) Boom Folding under 22 tonnes
   b) Boom Folding Unlimited tonnage
   c) Boom Stiff Under 40 tonnes
   d) Boom Stiff Unlimited tonnage

3) Tower Cranes
   a) Tower Crane
   b) Self Erect 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 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 Mobile Crane Program Standards and Assessment Tools (which includes the Common Core) as an integrated on job / off job Competency Based Qualification.

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 for 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:

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 15th 2007 and were subject to adjustment though the end of 2007 as they were 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 co-ordinating development of, and updates to, these standards.

For revision suggestions please email 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.

SECTION 1

OCCUPATION ANALYSIS CHART

CRANE OPERATOR CORE KNOWLEDGE & WORKPLACE COMPETENCY PROFILE CHART

1. **Safety (CS)** **Level 1**	**1.1 K** Demonstrate knowledge of safe working practices for crane operators 1	**1.2 K** Demonstrate knowledge of power line hazards and high voltage equipment 1	**1.3 W** Comply with WorkSafeBC and OH & S regulations 1			
2. **Communications (CCOM)** **Level 1**	**2.1 K** Demonstrate knowledge of personnel involved in crane operations 1	**2.2 K** Demonstrate knowledge of hand signals 1	**2.3 K** Demonstrate knowledge of radio communications 1	**2.4 K** Demonstrate knowledge of workplace communications 1	**2.5 W** Use hand signals in the workplace 1	**2.6 W** Use radio communications in the workplace 1
	2.7 W Communicate information clearly and check for understanding in the workplace 1					
3. **Cranes (CC)** **Level 1**	**3.1 K** Demonstrate knowledge of types of cranes and classifications 1	**3.2 K** Demonstrate knowledge of terminology related to craning and craning concepts 1	**3.3 K** Demonstrate knowledge of hoisting terminology, functions and systems 1	**3.4 K** Demonstrate knowledge of regulatory requirements pertaining to cranes 1		
4. **Rigging (CR)** **Level 1**	**4.1 K** Demonstrate knowledge of lifting theory and forces 1	**4.2 K** Demonstrate knowledge of rigging hardware, materials, tools and manuals 1	**4.3 K** Demonstrate knowledge of types and function of wire rope and chains 1	**4.4 K** Demonstrate knowledge of installation, inspection and storage of wire rope 1	**4.5 K** Demonstrate knowledge of rigging techniques 11	**4.6 W** Use rigging hardware and tools in the workplace 1
5. **Load Charts (CLC)** **Level 1**	**5.1 K** Demonstrate knowledge of determining weight loads using fundamental math functions and calculations 1	**5.2 K** Demonstrate knowledge of loading and lifting 1	**5.3 W** Interpret load charts and load study drawings to configure crane for workplace operation 1			

6. **Transportation and Delivery** **Level 1**						
7. **Site Planning and Crane Positioning** **Level 1**						
8. **Crane Operations (CCO)** **Level 1**	**8.1 K** Demonstrate knowledge of pre-operational requirements in crane operations 1	**8.4 W** Demonstrate crane set-up per manufacturer's instructions (except Task 4 in Mobile) 1				
9. **Maintenance and Service (CMS)** **Level 1**	**9.1 W** Maintain an equipment logbook to retain a permanent written record of maintenance and repairs 1					

SECTION 2

CRANE OPERATOR QUALIFICATION COMMON CORE PROGRAM OUTLINE

SUGGESTED SCHEDULE OF TIME ALLOTMENTS

TABLE OF SPECIFICATIONS

Core Level		Theory	Practical
Unit	**Section 1 – Safety Knowledge % of Time**	**5%**	
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	✓	
Unit	**Section 1 – Safety Practical (Workplace)**	**Must meet standards**	
CS 1.3 W	Comply with WorkSafeBC and OH & S regulations		✓
	Total Percentage for Section 1	**5%**	
Unit	**Section 2 - Communications Knowledge % of Time**	**5%**	
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	✓	
Unit	**Section 2 - Communications Practical**	**Must meet standards**	
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		✓
	Total Percentage for Section 2	**5%**	

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR CORE LEVEL

Core Level		Theory	Practical
Unit	**Section 3 – Cranes Knowledge % of Time**	**10%**	
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 3.3K	Demonstrate knowledge of hoisting terminology, functions and systems	✓	
CC 3.4 K	Demonstrate knowledge of regulatory requirements pertaining to cranes	✓	
	Total Percentage for Section 3	**10%**	
Unit	**Section 4 – Rigging Knowledge % of Time**	**20%**	
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	✓	
Unit	**Section 4 - Rigging Practical**	**Must meet standards**	
CR 4.6 W	Use rigging hardware and tools in the workplace		✓
	Total Percentage for Section 4	**20%**	
Unit	**Section 5 – Load Charts Knowledge % of Tim**	**30**	
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	✓	
Unit	**Section 5 – Load Charts Practical**	**Must meet standards**	
CLC 5.3 W	Interpret load charts and load study drawings to configure crane for workplace operation		✓
	Total Percentage for Section 5	**30%**	

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR LEVEL 3

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

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-Z150-98 (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, Construction Safety Association of Ontario, 1997
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

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_4)
    b. lower explosive limit (LEL)
    c. hydrogen sulphide (H_2S).

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 Z150-1974 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,
Construction Safety Association of Ontario, 1997
CSA Standard Z150-1974 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
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-Z150-98 (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,
Construction Safety Association of Ontario, 1997
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

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 apprentice's workplace

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-Z150-98 (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,
Construction Safety Association of Ontario, 1997
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

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-Z150-98 (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,
Construction Safety Association of Ontario, 1997
CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes, CSA Standard Z248 Safety Code for Tower 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

Task 1
Describe the hand signals used during crane operations.

Performance standards

1.1 Hand signals are accurately described

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-Z150-98 (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,
Construction Safety Association of Ontario, 1997
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

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-Z150-98 (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,
Construction Safety Association of Ontario, 1997
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,
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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 timidness 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,
Construction Safety Association of Ontario, 1997
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

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

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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
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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 timidness and fear of speaking up.

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-Z150-98 (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

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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

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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
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Quality Assurance
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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-Z150-98 (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
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References
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The Hoisting and Rigging Safety Manual, Construction Safety Association of Ontario, 1997
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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
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. Construction Safety Association of Ontario, 1997
4. CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes
5. CSA Standard Z248 Safety Code for Tower Cranes
6. ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane
7. Workplace Hazardous Material Information System (WHMIS)
8. Delivery agency policy

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

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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-Z150-98 (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
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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-Z150-98 (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
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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
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Quality Assurance
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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

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Quality Assurance

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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

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Quality Assurance

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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

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

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Quality Assurance

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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-Z150-98 (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, Construction Safety Association of Ontario, 1997
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

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, Construction Safety Association of Ontario, 1997
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

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

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-Z150-98 (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, Construction Safety Association of Ontario, 1997
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

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-Z150-98 (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, Construction Safety Association of Ontario, 1997
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

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.

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-Z150-98 (R2004) Safety Code for Mobile Cranes, ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/ASME 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, Construction Safety Association of Ontario, 1997 CAN/CSA-Z150-98 (R2004) Safety Code for Mobile Cranes,
ANSI Standard ANSI/ASME B 30.5-1994, Mobile and Locomotive Crane or
ANSI/ASME B30.22-1993, 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.

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.

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
Construction Safety Association of Ontario ..... ISBN 0-919465-70-6

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-Z150-98 (R2004) Safety Code for Mobile Cranes,

4. ANSI Standard ANSI/ASME B30.5-1994, Mobile and Locomotive Crane or ANSI/AMSE B30.22-1993, Articulating Boom Crane,

5. ANSI Standard ANSI/SIA A92.2-2001 American National Standard Vehicle-Mounted Elevating and Rotating Aerial Devices

BC Crane Safety

Crane Certification and Licensing Authority

BC Association for Crane Safety
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