VERSION 2.0

CraneSafe
BC & YUKON

British Columbia CraneSafe Certification

LATTICE BOOM FRICTION CRANE

Core Workplace Competencies

Practical Experience Requirements

Industry Skills & Knowledge Standards

Based on **BC Crane Operator Common Standards of Competence**

To order additional copies please contact:

Fulford Harbour Group
www.fulford.ca

SAFETY ADVISORY

Be advised that references to the WorkSafe BC 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.

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These core skills and abilities are the common foundation for all types of cranes.

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This is a guide to the skills, knowledge and ability identified by the crane industry in BC that you need to be a competent operator. This manual is designed to give you a brief overview of the crane standards and assessment process.

Competency Profiles

PROFILE CHART:
Crane Operator Core Knowledge & Workplace Competency

CORE UNITS: Prerequisite for Lattice Friction Crane

1. Safety (CS)

1.1 Demonstrate knowledge of safe working practices for crane operators (K)

1.2 Demonstrate knowledge of Workplace Hazardous Materials Information System (WHMIS) (K)

1.3 Manage first aid in emergency situations (K)

1.4 Demonstrate knowledge of power line hazards and high voltage equipment (K)

1.5 Comply with WorkSafe BC and OH&S regulations (W)

1.6 Respond to fire emergencies (W)

2. Communications (CCOM)

2.1 Demonstrate knowledge of personnel involved in crane operations (K)

2.2 Demonstrate knowledge of hand signals (K)

2.3 Demonstrate knowledge of radio communications (K)

2.4 Demonstrate knowledge of workplace communications (K)

2.5 Use hand signals in the workplace (W)

2.6 Use radio communications in the workplace (W)

2.7 Communicate information clearly and check for understanding in the workplace (W)

3. Cranes (CC)

3.1 Demonstrate knowledge of types of cranes and classifications (K)

3.3 Demonstrate knowledge of terminology related to craning and craning concepts (K)

3.6 Demonstrate knowledge of hoisting terminology, functions and systems (K)

3.7 Demonstrate knowledge of regulatory requirements pertaining to cranes (K)

4. Rigging (CR)

4.1 Demonstrate knowledge of lifting theory and forces (K)

4.2 Demonstrate knowledge of rigging hardware, materials, tools and manuals (K)

4.3 Demonstrate knowledge of types and function of wire rope and chains (K)

4.4 Demonstrate knowledge of installation, inspection and storage of wire rope (K)

4.5 Demonstrate knowledge of rigging techniques (K)

4.6 Use rigging hardware and tools in the workplace (W)

5. Lead Charts (CLC)

5.1 Demonstrate knowledge of determining weight loads using fundamental math functions and calculations (K)

5.2 Demonstrate knowledge of loading and lifting (K)

5.3 Interpret load charts and load study drawings to configure crane for workplace operation (W)

6. Transportation & Delivery (ATD)

7. Site Planning & Crane Positioning (ASPCP)

8. Crane Operations (CO)

8.1 Demonstrate knowledge of pre-operational requirements in crane operations (K)

8.4 Demonstrate crane set-up per manufacturer's instructions (except Task 4 in Mobile) (W)

9. Maintenance & Service (CMS)

9.7 Maintain an equipment logbook to retain a permanent written record of maintenance and repairs (W)

PROFILE CHART:
Mobile Crane Operator Knowledge Units & Workplace Competency
Lattice Boom Friction Crane

ADVANCED UNITS: Prerequisite for Lattice Friction Crane

3. Cranes (AC)

3.2 Demonstrate knowledge of crane components and attachments (K)

3.4 Demonstrate knowledge of engines and ancillary systems (K)

3.5 Demonstrate knowledge of power transfer for cranes (K)

6. Transportation & Delivery (ATD)

6.1 Demonstrate knowledge of BC Ministry of Transportation - Commercial Transport rules and regulations as they pertain to transportation of cranes (K)

6.2 Demonstrate knowledge to prepare and to transport a mobile crane (K)

6.3 Demonstrate knowledge of to assemble and disassemble a crane at a worksite (K)

6.4 Prepare and transport a mobile crane to a worksite following all highway and traffic rules and regulations (W)

6.5 Assemble and disassemble a crane at a worksite (W)

7. Site Planning & Crane Positioning (ASPCP)

7.1 Demonstrate knowledge of accurate site assessment tools (K)

7.2 Demonstrate knowledge to locate and safely position crane (K)

7.3 Conduct an accurate site assessment and safely position a crane in the workplace (W)

8. Crane Operations (CO)

8.2 Demonstrate knowledge of crane operations (K)

8.3 Demonstrate knowledge to leave a crane unattended (K)

8.4 Demonstrate crane set-up per manufacturer's instructions — Task 4 only (others core)

8.5 Use a mobile crane to safely pick and carry loads in a workplace (W)

8.6 Leave a crane unattended (W)

9. Maintenance & Service (CMS)

9.1 Demonstrate knowledge of inspecting engines, monitoring devices and hydraulic systems (K)

9.2 Demonstrate knowledge of servicing and maintenance procedures on mobile cranes (K)

9.3 Complete maintenance checklists (engine on / engine off) and maintain engines to manufacturer's specifications (W)

9.4 Perform routine inspections and maintenance of hydraulic systems (W)

9.5 Inspect monitoring devices and control mechanisms (W)

9.6 Perform service on engine cooling systems on mobile cranes (W)

12. Lattice Friction Crane (ALFC)

12.1 Demonstrate knowledge of lattice friction crane structure and assembly (K)

12.2 Demonstrate knowledge of lattice friction crane load charts and load calculations (K)

12.3 Demonstrate knowledge of lifting plans and rigging for lattice friction cranes (K)

12.4 Operate a lattice friction crane safely according to manufacturer's specifications and regulations (W)

CraneSafe Certification Competencies:

Knowledge, Skills & Abilities Identified by Industry

Introduction to CraneSafe Certification Assessments

Trainees demonstrate the skills they have learned in class and on the job in a practical assessment conducted by a CraneSafe Assessor.

Section 12 — Lattice Friction Crane

Unit Standard ALFC 12.4 W

WORKPLACE ASSESSMENT (no tonnage restrictions)

Operate a Lattice Friction Crane Safely According to Manufacturer's Specifications and Regulations

PURPOSE

This unit allows a trainee to demonstrate his or her skills to correctly operate a lattice friction crane.

The unit assessment covers several tasks that encompass a complete routine for operating a lattice friction crane. While each task is written separately, several of them will occur in sequence and/or concurrently. The emphasis in on the trainee being able to demonstrate the variety of skills required to competently operate the crane from start to finish.

It may not be possible to complete all the required tasks in the unit in one given day or lift so you may need to complete the requirements over a number of days. Ensure you write in date order in your trainee logbook the dates and activities you completed that can be considered towards this assessment.

TASK 1

You must configure the lattice friction crane appropriately interpreting load charts and load study drawings.

Refer to Task #1
Points 1.2, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

You must in be able to demonstrate the following:

- you sought verification from the crane supervisor of the load dimensions (and the engineer if applicable)
- you calculated the centre of gravity correctly
- you followed any special lift instructions
- you accurately determined safe working loads (WLL/SWL) for wire rope and rigging
- you selected the appropriate hardware and safety devices
- you considered and addressed the load on the slings for equal and unequal lengths

TASKS 2, 3 & 4

Preoperational inspections must be carried out and tests must be made to check whether repairs and/or general maintenance needs to be performed prior to the crane's operation. If general maintenance is required you must perform that and also complete any documentation required and made the entries in the crane logbook. Things to cover in the part of the assessment include:

- inspection procedures are thorough and meet the company's and the manufacturer's requirements
- the operator aids are located and checked
- inspection and erection reports are correctly completed and filed appropriately
- function tests on hoist systems and any repairs or maintenance is carried out
- defects, deficiencies and maintenance are correctly recorded in the crane log book

TASKS 5, 6, 7, 8, 9, 10, 11

In these tasks you must setup and operate the crane while monitoring its operation. The load must be safely moved to the correct location and post operation procedures must be demonstrated. A break down of the requirements includes:

- Performing setup procedures which include: (5.1, 5.2, 5.3, 5.4)
- Following the manufacturer's specifications

Refer to Tasks #5, 6, 7, 8, 9, 10 & 11 Points 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 7.1, 7.3, 8.1, 8.2, 9.1, 9.2, 10.1 & 11.1

- Checking for and avoiding overhead obstructions and underground hazards
- Using sufficient blocking or blocking mats for the load requirements and surface conditions
- Programming and adjusting devices
- Operating a lattice friction crane

Heavy Lift

Dragline Operation

Clamming

LIfting a Load under Water

Lifting from Barges or Floats

A number of different operations are required and for the purposes of the assessment they may have to be completed over an extended period of time. The lift types include:

- Firstly operating without a load and then with a load (6.1, 6.2)
- Controlling the hook block by using different techniques to address different conditions (these may need to be simulated as it is out of your control what weather conditions will occur which days) (7.1, 7.2)
- Safely hoisting the load. In this part you must simulate performing a hoist in the vicinity of high voltage equipment as well. (8.1, 8.2)
- Completing a blind lift – this may have to be done at a different time, or a different site. (8.3)
- Monitoring the equipment and troubleshooting while operating the crane (9.1, 9.2)
- Moving the load and properly placing it in the correct location (10.1)
- Performing post operational procedures (11.1)

The assessment should take place in the workplace during normal operations and will take a number of days to complete. Your Mentor must verify he has seen you complete these tasks. You must demonstrate these skills at work a minimum of three times before you can be assessed. Your Mentor will advise if you are to do this as part of routine operations in the workplace or as a separate assessment task. Remember to record all of the experience doing these tasks in your trainee logbook.

This completes the Core Workplace Competencies: Lattice Boom Friction Crane

The Assessment Tools against which you will be assessed as an Operator throughout, and at the end of your training period are included in the publication:

Crane Operator's Practical Assessment
This manual is available to guide you in reaching your goal as a competent Crane Operator and is also the Manual your Mentor will use to guide his or her assessment of your developing competence.

You record your evidence of workplace activity in a third book:

The Work Record
This is the place where you get your daily work experience down. The mentor will use this book to cross reference with the Assessment Manual.

Best wishes and Safe Craning!

Glossary

Assessor	The Assessor is the BCACS Assessor who is responsible for the final assessment of the Trainee (student) against a knowledge or workplace unit standard
Assessor – Third Party	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.
BCACS	BC Association for Crane Safety
Common Core of Competence Standards	The Common Core of Competence Standards are the Knowledge and Workplace unit standards that must be completed by all students before they can undertake further specialised training for certification on either the four Mobile Cranes types or the four Boom Truck crane types.
Certification	Upon successful completion of the Mobile Crane Common Core and successful completion of one further advanced module, either: Mobile Cranes 80 tonnes and under, Mobile Cranes Unlimited Tonnage, Mobile Lattice Friction Cranes, Mobile Lattice Hydraulic Cranes, Boom Truck with Folding Boom 22 tonnes and under, Boom Truck with Folding Boom (unlimited tonnage), Boom Truck with Stiff Boom 40 tonnes and under, Boom Truck with Stiff Boom (unlimited tonnage), Tower Crane or Self Erect Tower Crane, the Trainee will receive a 'Certificate of Qualification – Mobile Crane (Crane Type)' or 'Certificate of Qualification – Boom Truck Crane (Crane Type)' or 'Certificate of Qualification – Tower Crane (Crane Type)'
Imperial Ton – short ton & long ton	The standard ton in the U.S. measurement system is the "short ton", equal to 2000 pounds (exactly 907.18474 kg). Both long and short tons are defined as 20 hundredweights, but a hundredweight is 112 pounds in the Imperial system (long or gross hundredweight) and 100 pounds in the US system (short or net hundredweight). The spelling "tonne" denotes the metric tonne of 1000 kilograms (approximately 2204.623 pounds). Long Ton (L/T sometimes known as a Gross Ton, Weight Ton, or Imperial Ton) is the name for the unit called the "Ton" in the Avoirdupois or Imperial system of measurements, as formerly used in the United Kingdom and several other Commonwealth countries. It has been replaced by the metric tonne. It is equal to 2240 pounds (exactly 1016.0469088 kilograms). A long ton-force is 2,240 pounds-force (9,964 newtons[1]).

1 http://www.wikipedia.org

Incumbent/Existing Operator	Incumbent / Existing Operator means an operator who is registered with the BCACS as of July 1, 2007 or an operator coming from outside of British Columbia after July 1,2007 and who is in possession of an acceptable certificate. (Please contact the BCACS in writing or by email for more information regarding acceptable certificates.) Incumbent operator status will end on July 1, 2008. As of July 1, 2008 all operators will be required to possess their documented proof of competency as issued by BCACS.
ITA	Industry Training Authority
Knowledge Unit Standards of Competence	The theoretical component of Mobile Crane Certification is made up of the Knowledge Units, which: • can be taught in a classroom setting by a qualified instructor, or • delivered on line, or • learned through self study on line or through printed materials
Level One Operator	Level One Operator means a person new to crane operations who has not successfully challenged the core theory. This operator can operate only under direct hands-on supervision. A level one operator may only operate up to six months without successfully challenging the theory assessment. The Level One Certificate will be issued jointly to the employer and the operator and the Certificate may apply to any crane type.
Level Two Operator	Level Two Operator means a person who has passed the theory assessment and is certified to make routine lifts but will require hands-on supervision for all first time significant lifts and all high risk lifts. These routine lifts will be clearly documented by both the operator and the employer. Theory assessments for existing operators who choose to obtain Level 2 will be conducted by the employer. New operators will be required to pass a formal written assessment. A level two operator may choose to remain at this level for their working career or eventually they could challenge both the theory and the practical assessment to obtain a Level Three Certificate. A Level Two Certificate will specify what type of crane the operator may operate and their employer. The Level Two Certificate is only valid while working for the identified employer on the certificate.

Level Three Operator and Interim Level Three Operator	Level Three 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 Level Three 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. Interim Level Three Operator means an incumbent operator who has registered before July 1, 2007 and has also signed a statement declaring that he or she is qualified to provide hands on supervision for Level One operators and to provide hands on supervision and has the ability to sign off for Level Two operators. This interim provision is necessary to phase in OHSR 14.34.1 (the new certification process) and will allow the Interim Level Three operator to sign off Level Two operators who have successfully performed first time significant lifts. This interim provision will expire on July 1, 2008 and only certified Level Three operators may provide hands on supervision or sign off after July 1, 2008.
Mentor	A mentor is a journeyperson who is the student/trainee's on-the-job coach, and is responsible for day-to-day assessment of the Trainee's work and for coaching, training and supervision on-the-job.
Metric tonne	A tonne (t) or metric ton (M/T), sometimes referred to as a metric tonne, is a measurement of mass equal to 1,000 kilograms. A tonne (t) or metric ton (M/T), sometimes referred to as a metric tonne, is a measurement of mass equal to 1,000 kilograms[2].

2 http://www.wikipedia.org

Practical Assessment	Practical Assessment means an assessment conducted by a third party assessor, and supervised 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 Level One or Two 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.
Theory Assessment	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.
Work Experience Diary	The Work Experience Diary is a Work Record book (a journal) with pages in which the Trainee documents the dates and details of the practice tasks he has performed leading up to the assessment. The amount of time a Trainee must demonstrate the tasks prior to being assessed is stipulated in the Workplace Assessment Documents. It also contains an Evidence section – in which the Trainee inserts the pieces of evidence that are requested in the Workplace Assessment Document.
Workplace Units Standards of Competence	The practical component of Mobile Crane Certification 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

Metric Conversion Help

For an online Metric Converters try:

http://www.worldwidemetric.com/metcal.htm

http://www.sciencemadesimple.com/weight_conversion.php

Conversion Factors	
Imperial to Metric	
1 ounce =	28.375 grams
1 pound =	454 grams
1 short ton (2K) =	907 kilograms
1 metric tonne (2.2K) =	1,000 kilograms
1 inch =	2.54 centimetres
1 foot =	30.48 centimetres
1 yard =	91.44 centimetres
1 cubic foot =	28,316.846 cubic centimetres
1 Imperial gallon =	1.201 US gallons
1 Imperial gallon =	4.546 litres
1 Imperial pint =	0.568 litres
Metric to Imperial	
1 gram =	0.0352 ounces
1 kilogram =	2.204 pounds (= 1000 grams)
1 metric tonne =	2,204 pounds
1 centimetre =	0.394 inches
1 metre =	39.37 inches
1 cubic metre =	1.308 cubic yards
1 litre =	61.024 cubic inches
1 litre =	0.220 Imperial gallons
1 litre =	0.264 US gallons
1 litre =	1.760 Imperial pints

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
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:

Cranes: Types, Components and Case Histories (FD001)

Hazard Awareness in Crane Operating Areas (FD002)

International Hand Signals (FD003)

Wire Rope (FD004)

Hardware (FD005)

Chain (FD006)

Slings (FD007)

Reeving (FD008)

Hoists, Winches and Related Devices (FD009)

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. CSA Standard Z150-1998 Safety Code for Mobile Cranes,
4. ANSI Standard ANSI/ASME B30.5-2004, Mobile and Locomotive Crane or ANSI/ASME B30.22-2005, Articulating Boom Crane,