



# Fulford

CERTIFICATION

## Level B/D Core Theory On-Line Exam: How to Prepare

### ACCESSING THE TEST

Level B/D certification requires operators to pass the BC Crane Safety – Crane Core Theory Test. This is a multiple choice test that is delivered on-line. Once your application is processed you will receive a username and password that you will enter into a login page. Full details will be provided to you by email along with your username and password.

### QUESTIONS

There are a total of 23 questions. A result of 17 or higher is required to pass the test. You may attempt the test three times. If you are not successful on your first or second attempt, you will need to submit a Re-Application Form with the fee for each re-attempt. If, after the third attempt, you have not achieved a result of 17 or higher, you will need to re-apply for certification.

### CERTIFICATE

Once you have passed the test, you will be issued your Photo ID Certificate by mail. You will receive this card within 2 weeks of completing the test.

### FIGURES BOOKLET

You will need to have the BCACS Exam Figures Booklet to complete the test. A copy of the Figures Booklet is attached to the practice exam. This is a short document that contains rigging capacity tables and a table of material weights. It is very important that you have a printed copy before you take the test. You will need to use the information included in it to answer some of the questions on the test.

### TIME LIMIT

Once you begin the test you will have 60 minutes to complete the test. The timer cannot be stopped once you start. Once you have begun the exam, you will be able to go forward or back to review and change your answers or skip ahead if you wish. The copy and paste functions on your computer will not function while you are doing the test.

When you are satisfied with your answers, press the submit button and you will be given your score. Do not click on the SUBMIT button before you have answered all the questions. Clicking on the Submit button will end the exam.



## HOW TO PREPARE

What's on the test?

The test is made up of 6 sections with a total of 23 questions. Each question is worth one point.

### 1. SAFETY (5 points)

Safe working practices for crane operators

[WorkSafe BC Part 14 - Cranes & Hoists.](#)

Power line hazards and high voltage equipment

[WorkSafe BC Electrical Safety Part-19](#)

### 2. COMMUNICATIONS (2 points)

Hand signals

[WorkSafe BC hand signals](#)

### 3. CRANES (3 points)

Craning and hoisting terminology

[Glossary-of-Crane-Industry-Terms](#)

Regulations

[WorkSafe BC Part 14 - Cranes & Hoists.](#)

### 4. RIGGING (7 points)

Lifting theory and forces

Slings, wire ropes, rigging hardware and capacity cards (see practice exam)

Inspection and storage of slings and hardware

[WorkSafeBC Part 15 - Rigging Regulations](#)

*Fulford Level 1 Rigging Manual* (contact office for purchase)

### 5. HOISTING (3 points)

Calculating load weights (see practice exam)

### 6. CRANE OPERATIONS (3 points)

Pre-operational requirements

Positioning and set-up of a crane

[WorkSafeBC Part 15 - Rigging Regulations](#)

## 1 What is the Online Core Theory Test?

Level B and Level D Certification requires operators to successfully pass the BC Crane Safety **Crane Core Theory Test**. This is a multiple choice test that is delivered on-line.

## 2 How do I access the Online Test?

Once your application is processed you will receive a username and password that you will enter into a login page on our website. Full details will be provided to you by email along with your username and password.

## 3 What is the Figures Booklet?

This short document contains rigging capacity tables and a table of material weights.

It is very important that you have a printed copy before you take the test. You will need to use the information included in it to answer some of the questions on the test.

You will also receive the Exam Figures Booklet with your login email.

## 4 What subjects are covered on the test?

The test covers the following three competence areas:

### 1. BASIC CRANE TERMINOLOGY

*i.e. What does reeving mean?*

### 2. BASIC RIGGING CALCULATIONS

using formulas provided

*i.e. How much does a six foot by six foot by 2 foot (6' x 6' x 2') concrete block weigh?*

### 3. RIGGING CALCULATIONS

involving slings

*i.e. To lift a 1,200 kg concrete block, what diameter of nylon web sling is required? (using rigging capacity tables provided in the Exam Figures Booklet)*

### Question Topic Areas

The test is made up of six sections for a total 23 points:

#### SAFETY (5 points)

1. Safe working practices for crane operators
2. Power line hazards and high voltage equipment

#### COMMUNICATIONS (2 points)

1. Hand signals

#### CRANES (3 points)

1. Craning and hoisting terminology
2. Regulations

#### RIGGING (7 points)

1. Lifting theory and forces
2. Slings, wire ropes, rigging hardware and capacity cards
3. Inspection and storage of slings and hardware

#### HOISTING (3 points)

1. Calculating load weights

#### CRANE OPERATIONS (3 points)

1. Pre-operational requirements
2. Positioning and set-up of a crane

## 5 What is a Multiple Choice Test?

A multiple choice test is one where the question is accompanied by a choice of four possible answers, only one of which is correct. You must choose the answer which you believe is correct. Here is an example:

1. What is the function of an anti-two block device on a crane?
  - a. It prevents twisting of wire rope on the hoist drum, thereby ensuring a longer service life for the wire rope.
  - b. It prevents the hook assembly from rotating excessively when the load is hoisted close to the tip of the boom.
  - c. It prevents the lower load block (or hook assembly) coming in contact with the upper load block (or boom point sheave assembly).
  - d. It prevents the operator of the crane from applying an excessive load moment to the crane when swinging a load by reducing the speed of the rotation drive.

C is the correct answer.

There is no pattern as to which letter is the right answer. The system generates a new test from a bank of questions each time you log in. The questions and answers are ordered differently each time the test is viewed.

## 6 Time Limit

Once you begin the test you will have 60 minutes to complete the test. The timer cannot be stopped once you start.

Once you have begun the exam, you will be able to go forward or back to review and change your answers or skip ahead if you wish.

The copy and paste functions on your computer will not function while you are doing the test.

When you are satisfied with your answers, press the SUBMIT button and you will be given your score. Do not click on the SUBMIT button before you have answered all the questions. Clicking on the Submit button will end the exam.

## 7 Where to find study resources

### 1. SAFETY (5 points)

Safe working practices for crane operators  
[WorkSafe BC Part 14 - Cranes & Hoists](#)  
Power line hazards and high voltage equipment  
[WorkSafe BC Electrical Safety Part-19](#)

### 2. COMMUNICATIONS (2 points)

Hand signals  
[WorkSafe BC hand signals](#)

### 3. CRANES (3 points)

Craning and hoisting terminology  
[Glossary-of-Crane-Industry-Terms](#)  
Regulations  
[WorkSafe BC Part 14 - Cranes & Hoists](#)

### 4. RIGGING (7 points)

Lifting theory and forces  
Slings, wire ropes, rigging hardware and capacity cards (see practice exam)  
Inspection and storage of slings and hardware  
[WorkSafeBC Part 15 - Rigging Regulations](#)  
Fulford Level 1 Rigging Manual (contact office for purchase)

### 5. HOISTING (3 points)

Calculating load weights (see practice exam)

### 6. CRANE OPERATIONS (3 points)

Pre-operational requirements  
Positioning and set-up of a crane  
[WorkSafeBC Part 15 - Rigging Regulations](#)

## Tonne versus Ton

A Tonne is a metric ton.

1 Tonne = 1,000 kg or 2,205 lbs

1 Tonne = 1.1023 short tons (American tons)

1 Tonne = 0.9844 long tons (Imperial tons)

1 Short Ton (American ton) = 2,000 lbs or 907 kg

## 8 Get organised!

### FIGURES BOOKLET

- Make sure that you have a printed copy of the Figures Booklet and that you have reviewed it before you begin your exam.
- You will also need a calculator and a pencil and paper.

### TIME LIMIT

- The timer starts once you begin the exam and you have 60 minutes to complete all the questions.
- NOTE: Once the time starts, you are not able to go back and print the Figures Booklet or to stop or restart your time.

## 10 What happens if you are not successful?

### GRADE

- A score of 16/23 or less means that you have not successfully completed your exam.

### RE-TEST

- You can rewrite the online test twice if necessary. If, after that, you have not successfully completed the online test, you will need to reapply for Level B or D certification.
- To rewrite the test, you will need to fill out and submit a Re-Application form with the \$60 fee.
- You must wait a minimum of 72 hours (3 full days) between each attempt.
- Make sure you review the study materials.
- If, after the third attempt, you have not achieved a result of 17 or higher, you will need to reapply for certification.

## 9 What happens when you are successful?

### GRADE

- A score of 17/23 or higher means that you have successfully completed your exam.

### PHOTO ID

- If you have not already done so, please send your photo to the Certificate Coordinator.
- Send either a passport sized photo of the trainee crane operator clearly labelled.  
Or, email a digital photograph (min. 300 dpi / medium resolution) to [certificates@fulford.ca](mailto:certificates@fulford.ca).
- Minimum size: 2" wide x 2.75" high (600 px wide x 825 px high)
- No hats or sunglasses to be worn. Must include the head and shoulders.

## 11 Receiving the certificate

- Your certificate will be mailed out within 5 business days of your successful completion of the exam.



If you would like an electronic copy of your letter of certification and wallet id emailed to you prior to receiving them in the mail, send your request to [certificates@fulford.ca](mailto:certificates@fulford.ca). Include your first and last name as well as the certificate (level and crane type) you are requesting.

10 February 2021

Level B & D – Online Core Theory Test

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## How to get in touch with Fulford CraneSafe

Please contact Fulford with any questions you have about crane operator certification in BC.

Office hours are Monday to Friday, 8.00am to 4.00pm.

### CraneSafe + Fulford Certification

Suite 508 – 602 West Hastings Street  
Vancouver, BC, V6B 1P2

Telephone: 604.398.5230 | Toll free: 1.888.952.6033

Fax: 604.398.5236 | [info@fulford.ca](mailto:info@fulford.ca) | [www.fulford.ca](http://www.fulford.ca)



## Hoist Lines

### 15.25 Wire Rope Rejection Criteria

Wire rope must be permanently removed from service if

- (a) in running wire ropes, there are 6 or more randomly distributed wires broken in one rope lay or 3 or more wires are broken in one strand in one lay,
- (b) in stationary wire ropes, such as guylines, there are 3 or more broken wires in one lay in sections between end connections, or more than one broken wire within one lay of an end connection,
- (c) wear, or the effects of corrosion, exceed  $\frac{1}{3}$  of the original diameter of outside individual wires,
- (d) there is evidence of kinking, bird-caging or any other damage resulting in distortion of the rope structure,
- (e) there is evidence of heat or arc damage, or
- (f) there are reductions of normal rope diameter, from any cause, in excess of
  - (i) 0.4 mm ( $\frac{1}{64}$  in) for diameters up to and including 8 mm ( $\frac{5}{16}$  in),
  - (ii) 1 mm ( $\frac{3}{64}$  in) for diameters greater than 8 mm ( $\frac{5}{16}$  in) up to and including 19 mm ( $\frac{3}{4}$  in),
  - (iii) 2 mm ( $\frac{1}{16}$  in) for diameters greater than 19 mm ( $\frac{3}{4}$  in) up to and including 29 mm ( $1\frac{1}{8}$  in), or
  - (iv) 3 mm ( $\frac{3}{32}$  in) for diameters greater than 29 mm ( $1\frac{1}{8}$  in).

### 15.26 Non-Rotating Wire Rope

Wire rope with non-rotating construction must be removed from service if

- (a) the rejection criteria in section 15.25 are met,
- (b) there are 2 randomly distributed broken wires in 6 rope diameters, or
- (c) there are 4 randomly distributed broken wires in 30 rope diameters.

### 15.15 Wraps Required

At least 2 full wraps of rope must remain on winding drums when the load hook is in the lowest position.

### 15.7 Wire Rope on Mobile Cranes

The minimum design factor based on breaking strength for wire rope on a mobile crane, unless otherwise specified by the crane or wire rope manufacturer, is

- (a) for conventional wire rope
  - (i) 2.5 for pendant lines, 3 for boom hoist reeving and 3.5 for load lines, during erection, and
  - (ii) 3 for pendant lines, 3.5 for boom hoist reeving and 3.5 for load lines, at all times except during erection, and
- (b) 5 for wire rope of non-rotating construction.

## Blocks, Overhaul Balls, Hooks & Sheaves

### 15.17 Sheaves

A sheave must

- (a) be correctly sized for the rope,
- (b) have a device to retain the rope within the groove, and
- (c) be removed from service if it has a damaged groove or flange.

### 15.10 Open Hook Restriction

- (1) A hook must have a safety latch or other means that will retain slings, chains, or other similar parts, under slack conditions.
- (2) A hook used in an application where manipulation of a safety latch or other retaining means may cause a hazard to a worker or where there is no hazard to a worker if the load becomes dislodged is exempt from the requirements of subsection (1).

### 15.29 Hook Rejection Criteria

A worn or damaged hook must be permanently removed from service if:

- (a) the throat opening, measured at the narrowest point, has increased by more than 15% of the original opening,
- (b) the hook has twisted more than  $10^\circ$  from the original plane of the hook,
- (c) the hook has lost 10% or more of its cross-sectional area,
- (d) the hook is cracked or otherwise defective, or
- (e) wear or damage exceeds any criteria specified by the manufacturer.

## Rigging Design Factors

Table 15-1: Minimum Design Factors for Rigging

Component	Min. Design Factor
Nylon fibre rope sling	5
Polyester rope sling	5
Polypropylene rope sling	5
Wire rope sling	5
Metal mesh sling	5
Synthetic web sling	5
Synthetic round sling	5
Wire rope sling fittings	5
Conventional wire rope	5
Non-rotating wire rope	as specified by manufacturer but not less than 5
Other fittings	as specified by manufacturer
Alloy steel chain sling	4
Chain fittings	4

- (3) The design factor for any rigging assembly used to support workers must be at least 10.

## 3 Keys of Electrical Safety

### #1 – Look Up & Down

- Plan your work to prevent electrical contact – and call for assistance
- Identify overhead and underground power lines

### #2 – Keep Back – Know Your Limits

- On foot, stay at least 10 metres (33 feet) away from equipment operating around power lines.
- Use a spotter to make sure you keep equipment back at least 6 metres (20 feet) from power lines

### #3 – Stay Back & Call for Help

- Stay back 10 metres (33 feet) from a fallen power line, exposed underground power line or any object in contact with a line.
- If your equipment contacts a line, stay put until help arrives.
- If it's a life threatening situation, jump clear of your vehicle, feet together, and shuffle away keeping both feet close together. Never contact the ground and your vehicle at the same time.
- Call for Help. Do not attempt a rescue until directed by BC Hydro personnel.

## How Electricity Behaves

### Ripple Effect

If anything makes contact with a high voltage power line, such as a tree or an uninsulated boom on a truck, or if a broken power line falls to the ground or lands on a vehicle, electricity will flow to the ground and spread out in concentric circles like the ripples in a pool of water.

Voltage is very high at the point where electricity makes contact with the ground. The level of intensity decreases as the distance increases from the point of contact. Zero voltage is approximately 10 metres (33 feet) from the point of contact.

### Step Potential

Due to the difference in voltage as one moves towards or away from the source of electricity, it is possible to “step” between high and low voltage differences.

As the human body is usually a better conductor of electricity than the ground, the electricity can flow between the feet through the body with sometimes devastating results. This is referred to as “step potential.”

### Touch potential

Trees can be very conductive. If a tree comes into contact with a high voltage power line and a person is touching the tree or touching a ladder leaning against the tree, there will be a high to low voltage difference between the person and the ground.

This will force electrical current to flow through them to the ground and may easily result in serious injury or worse. This is referred to as “touch potential.”

## What to Do in Case of Electrical Contact

### Is there an immediate threat to life or a fire?

- If YES, call 911. They will contact BC Hydro to shut off the power.
- If NO, call 1 888 POWERON (769 3766 or \*49376) to have BC Hydro shut off the power.

### Shuffle or Hop – Don't Step

- If the ground becomes energized while you work, avoid shock by keeping your feet close together and shuffle away – never allowing the heel of one foot to move beyond the toe of the other.
- If you cannot shuffle approximately 10 metres (33 feet) away from the energized area, put your feet together and hop, but never walk.

## Limits of Approach

### Planning to work near energized high-voltage equipment and conductors?

Where work is to be conducted in the vicinity of energized high-voltage electrical conductors, WorkSafe BC regulations specify the safe limits of approach that must be maintained by any worker, work, tool, machine, equipment or material.

VOLTAGE	MINIMUM DISTANCE
Phase to Phase	Metres
Over 750 V to 75 kV	3
Over 75 kV to 250 kV	4.5
Over 250 kV to 550 kV	6

### Plan Before You Start

You must notify BC Hydro if your work or equipment, or any inadvertent movement of persons or equipment located outside the limits of approach, could possibly result in encroachment of the limits of approach. BC Hydro will work with you to determine what steps are required to protect you, your workers and the BC Hydro distribution system. If necessary, we will also help you complete WorkSafe BC's 30M33 form.

For more information, contact BC Hydro's Electric Service Coordination Centre at 1 877 520 1355.

### WorkSafeBC 30M33 Form: Assurance in Writing

Form 30M33 is provided to and used by all power system owners in B.C. It is currently the only assurance in writing form that is acceptable to WorkSafeBC.

This form must be completed prior to commencement of work near energized overhead powerlines.



## Hand signals for hoist and crane operations

If hand signals are used between a signaller and the operator of a crane or hoist to control hoisting operations, the following signals should be used:

### STOP



Arm extended, palm down, move hand horizontal.

### HOIST



With forearm vertical, finger pointing up, move hand in small horizontal circles.

### LOWER



With arm extended down, move forefinger; pointing down, move hand in circles.

### RAISE BOOM



Arm extended, fingers closed, thumb pointing upward.

### LOWER BOOM



Arm extended, fingers closed, thumb pointing downward.

### RAISE THE BOOM AND LOWER THE LOAD



With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



Arm extended, fingers closed, thumb pointing upward, other arm bent slightly with forefinger pointing down, and rotate hand.

### LOWER THE BOOM AND RAISE THE LOAD



With arm extended, thumb down, flex fingers in and out as long as load movement is desired.



Arm extended, fingers closed, thumb down, other arm vertical, forefinger upward and rotate hand.

### EXTEND BOOM



Both fists in front of body, with thumbs pointing outward.

### RETRACT BOOM



Both fists in front of body, with thumbs pointing toward each other.

### SWING



Arm extended, point in direction of swing of boom.

### MOVE SLOWLY



Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal (hoist slowly shown as example)

### DOG (STOP) EVERYTHING



Clasp hands in front of body.