

SLEWING MOBILE CRANE SAFETY AND LICENCE GUIDE

Training support material for:

TLILIC0020

Licence to operate a slewing mobile crane
(Over 100 tonnes)



Produced by:



PICTURE BASED. PLAIN ENGLISH. LEARNING MADE EASY.

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Introduction to Slewing Mobile Crane (over 100 tonnes)

What is a slewing mobile crane

A slewing mobile crane is a powered crane which features a boom or jib that can slew from front to back. The crane is mounted on a vehicle.

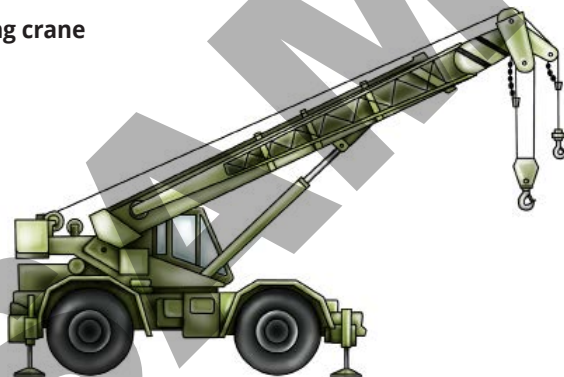
Slewing mobile crane



Crawler crane

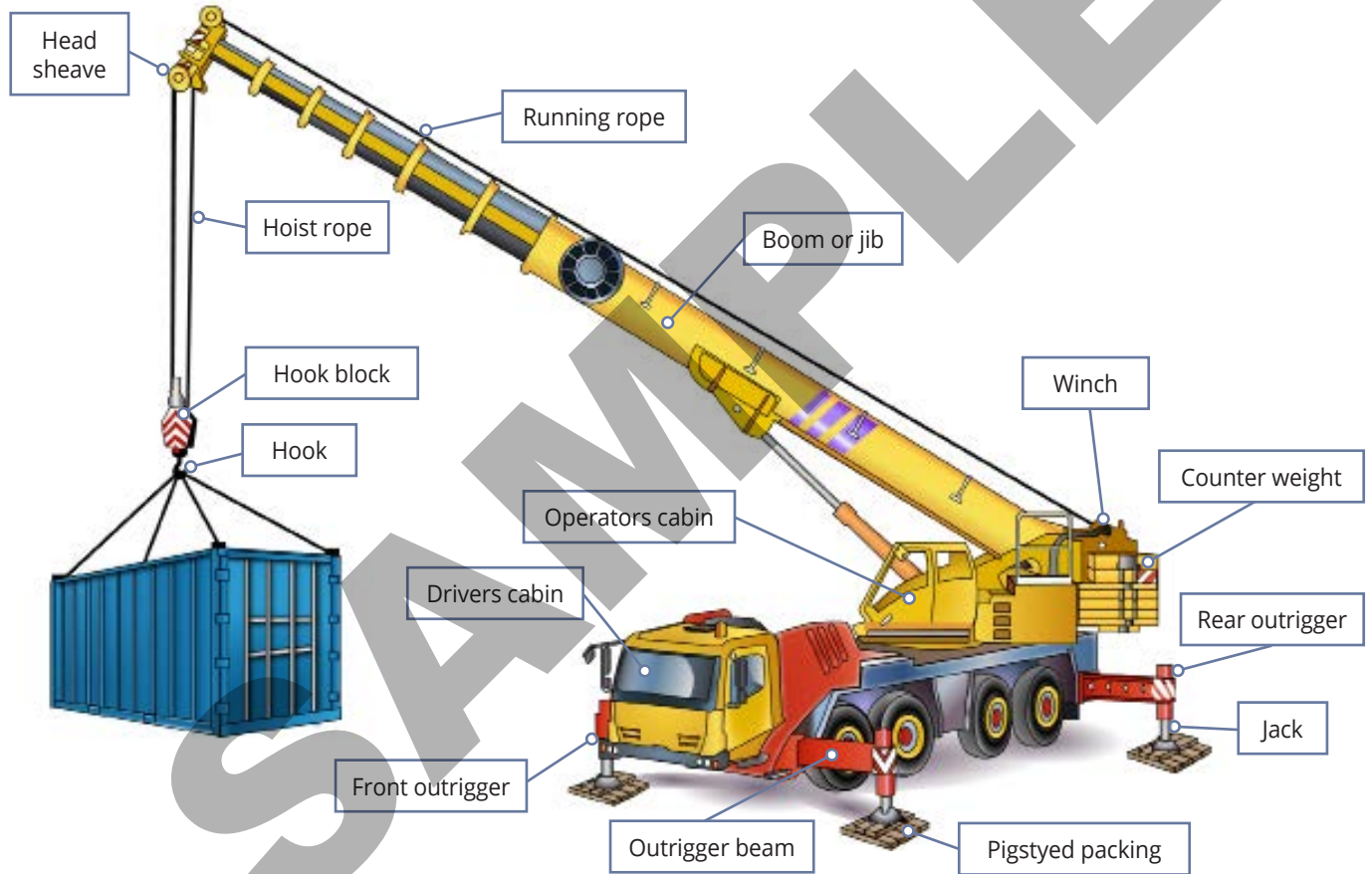


Rough terrain slewing crane



This learner resource does not cover front-end loader, backhoe, excavator or similar equipment when configured (arranged or set up) for crane operations.

Parts of a slewing mobile crane

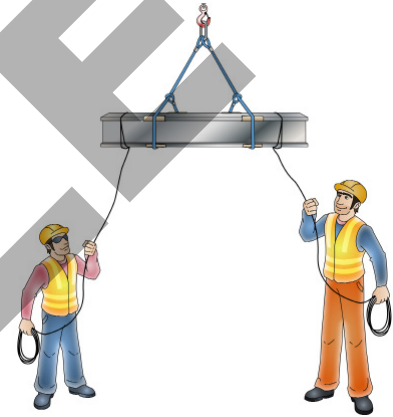


What is a dogger/dogman?

The crane operator must work closely with a dogman (dogger).

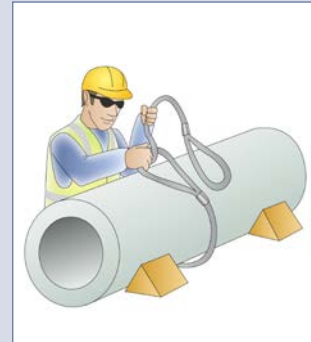
The dogman is responsible for:

- Selecting and inspecting lifting gear/equipment
- Slings loads
- Guiding/directing a crane operator in the movement of a load
- Working out the weight of a load
- Working out the best ways to sling a load
- Working with the crane operator to make sure the crane is right for the job.



You must hold the correct licence or be enrolled in a course with an RTO and under the supervision of a licenced dogman to perform any of the tasks listed above.

In this book the term **dogger** or **dogman** also means **rigger**.



Element 1 – Plan work / task

What is a lift plan?

A lift plan is a document that outlines the size of a load, weight, dimensions, center of gravity, resources needed for lift, sling equipment list and a hazard risk assessment. The following is a sample template of a lift plan.

Lift Plan

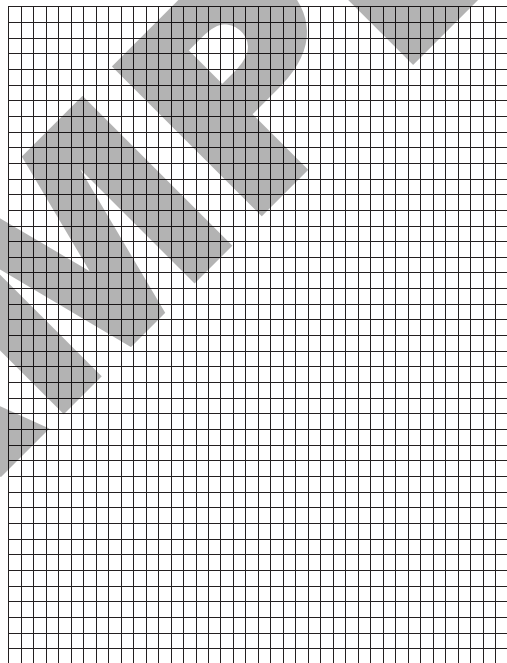
1. Project Details:		Version No:				
Candidate Name:		Site Pick up address:				
Operator Contact Details / Supervisor		Site Drop off Address:				
Crane make / model		Crane ID				
Lift 1 Description						
Lift 2 Description						
Lift 3 Description						
Lift 4 Description						
Item Details		Lift 1	Lift 2	Lift 3	Lift 4	
Weight of Load	Kg	Kg	Kg	Kg	Kg	
Weight of rigging	Kg	Kg	Kg	Kg	Kg	
Weight of hooks	Kg	Kg	Kg	Kg	Kg	
Additional Weight	Kg	Kg	Kg	Kg	Kg	
Total*	Kg	Kg	Kg	Kg	Kg	
Boom Length	M	M	M	M	M	
Boom sequence						
Line pull	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg	
Parts of line	M	M	M	M	M	
Hook block WLL	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg	
Pick up radius	M	M	M	M	M	
Set down radius	M	M	M	M	M	
Max radius	M	M	M	M	M	
RC at Max radius	Kg	Kg	Kg	Kg	Kg	
Communication Method	H	2WR	W	H	2WR	W
Method						
* Operator to Calculate / Sling Calculation						
2. Equipment for load lift / sling						
Dogger/Assessor initial						
3.* Sling Calculation Notes:						
4.^ Risk Controls: See additional note template.						

5.^ Sketch

For one of your lifts you will need to sketch the environment and any obstacles present.

Sketch one load and show the following:

1. Crane standing position
2. Stabiliser location
3. Load location
4. Show distances and load movement-direction
5. Any obstacles



QUESTION 7.2

How do we determine what loads must be performed?

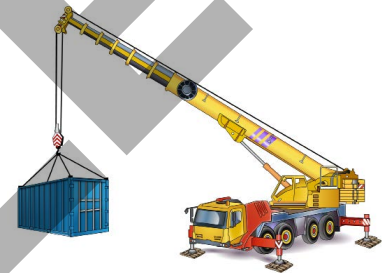
We look at the lift plan.

How else can we determine the rated capacity of a crane?

We can look at the load chart.

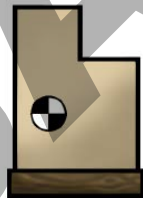
Lift Plan

1. Project Details:		Version No:		
Candidate Name:		Site Pick up address:		
Operator Contact Details / Supervisor		Site Drop off Address:		
Crane make / model		Crane ID		
Lift 1 Description				
Lift 2 Description				
Lift 3 Description				
Lift 4 Description				
Item Details	Lift 1	Lift 2	Lift 3	Lift 4
Weight of Load	Kg	Kg	Kg	Kg
Weight of rigging	Kg	Kg	Kg	Kg
Weight of hooks	Kg	Kg	Kg	Kg
Additional Weight	Kg	Kg	Kg	Kg

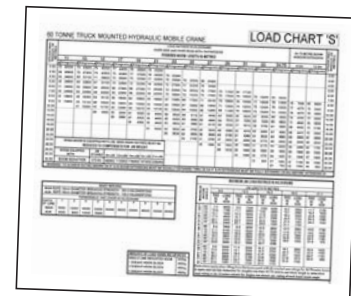


The following is some information that you might find in a **lift plan**.

- **Load 1.** a load of >50% of the RC of the crane with a boom length of >75%, and
- **Load 2.** stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling, and
- **Load 3.** an asymmetrical load that requires a dogger to sling, and
- **Load 4.** a round load with a minimum diameter of 300 mm and minimum length of three m that requires a dogger to sling

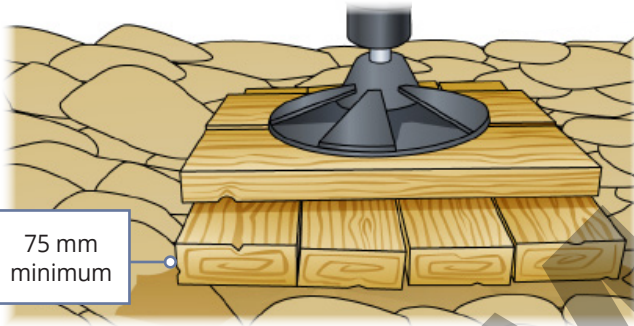


asymmetrical load

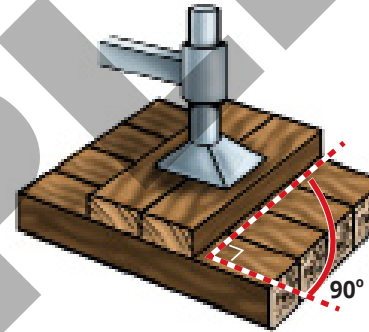


Outriggers and packing (continued)

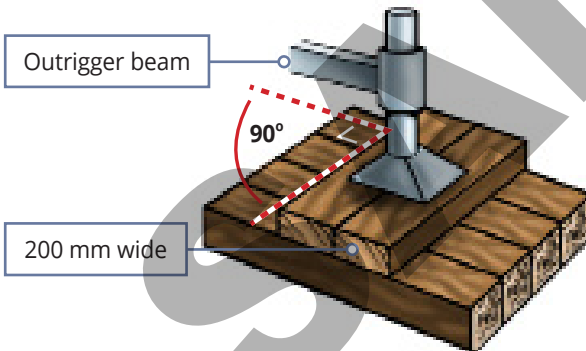
The base layer of packing should be closely laid and at least 75 mm thick



The packing should be pigstyed. This means each layer is at right angles (90° degrees) to the next.



The top layer of packing must be at right angles to the direction of the outrigger beam and at least 200 mm wide.



Packing, outriggers and jacks should be checked regularly during an operation.



QUESTION 13

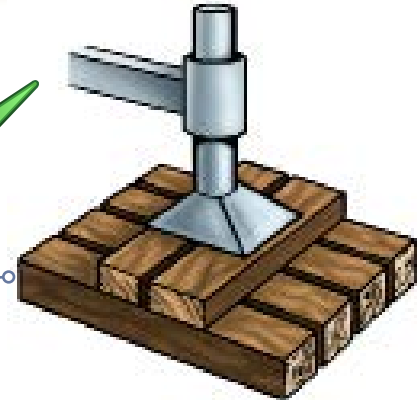
You will work in an area with soft, wet ground. The crane might sink.

How can you make the crane stable?

You can use hardwood packing or steel plates (cribbing or pigstyng).



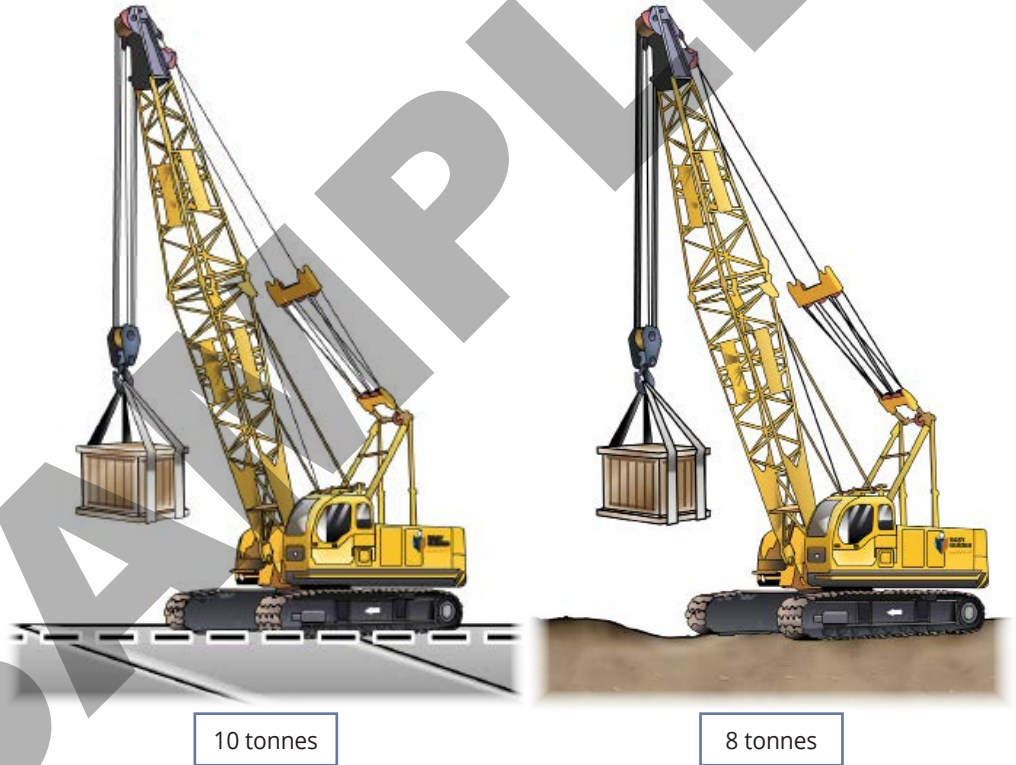
Pigstyng



QUESTION 14

What does uneven ground do to the capacity of a crawler crane?

Uneven ground **reduces** the capacity of a crawler crane.



QUESTION 34

What hazards (dangers) are there if people work near the outriggers or chassis of a slewing crane?

The crane or load could hit or crush a person between the crane and outrigger. Individuals should stay **outside** the exclusion zone.



QUESTION 35

You are working on a demolition site.

What are some of the **hazards** you must plan for?

If you set up on rubble it might be unstable.



There might be holes you can't see. For example lift wells, stairwells, or other cavities or chambers.

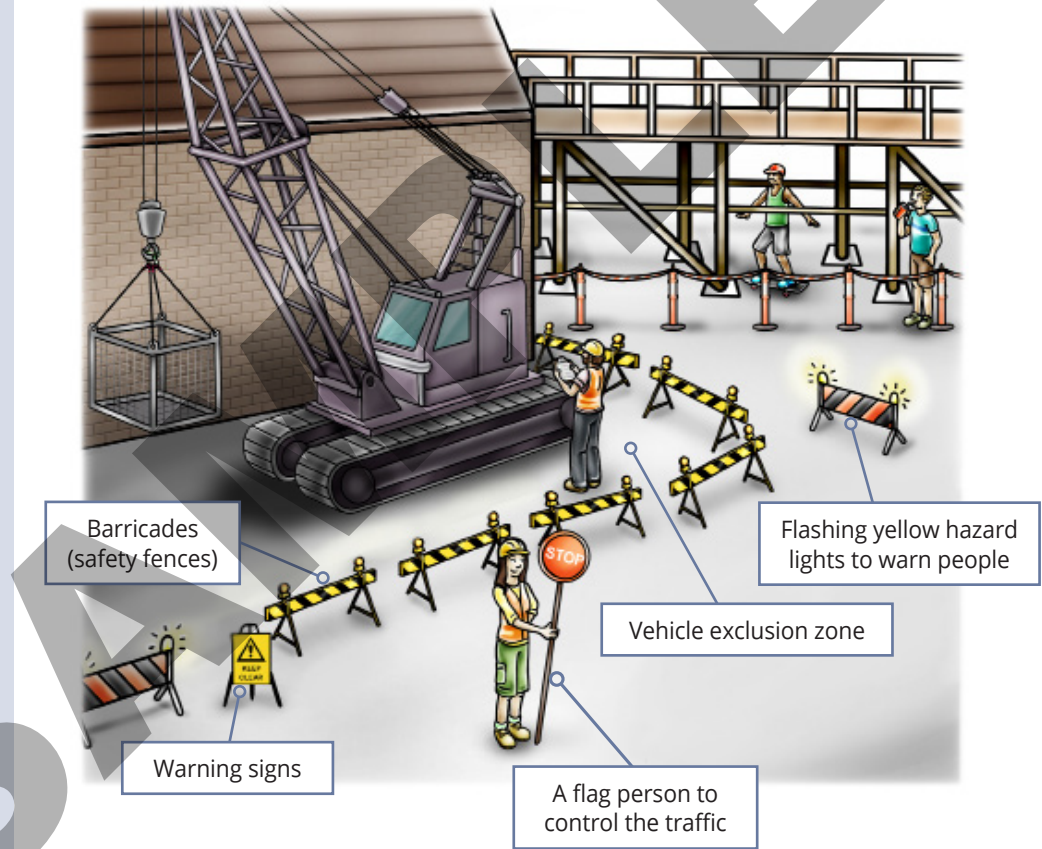


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QUESTION 43

What hazard controls can you use for vehicles or plant on the job?

Some methods you can use are:



Element 2 – Prepare for work /task

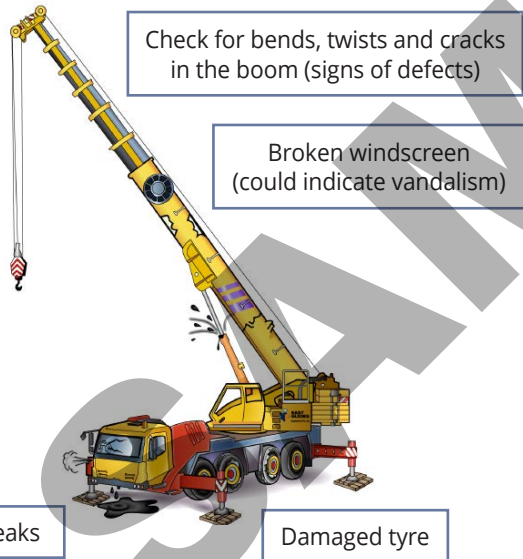
Check the crane

This section is about checking the crane for problems and what to do if you find any problems. It covers visual checks, signs and labels, pre-operational checks, crane controls, checking the logbook, starting the crane, post-start checks and recording and reporting faults.

Visual check

Make sure you have a look around the slewing mobile crane before you use it. See if the crane and lifting equipment are in a safe working condition and are right for the job before you lift any loads. A faulty crane could cause an accident and injure or kill you or your workmates.

Some examples of checks you should do are:



Crane operator

As the crane operator, you are **responsible** for inspecting the crane.

If you think someone has tampered with the crane, you must **report** this problem to your supervisor or some other authorised person immediately.

The crane owner and workplace security may also need to be informed.

If someone has mucked about with the crane, report the fault to your supervisor.



Crane computer

Enter configuration data into the crane's computer

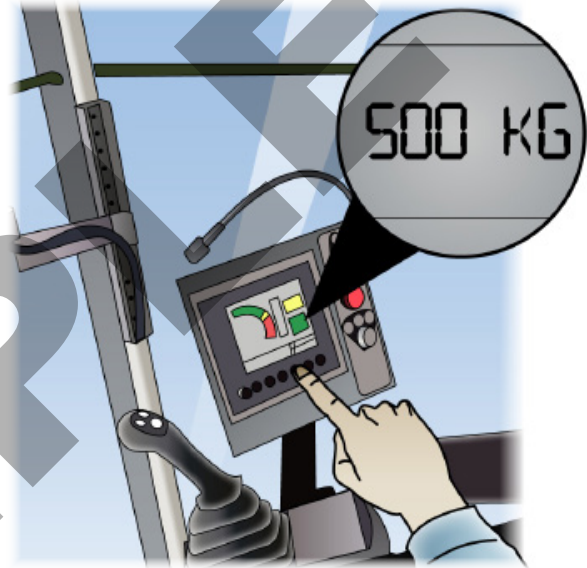
The crane's computer helps prevent the crane from overloading and overturning. The computer also has a load limiting/indicating system.

Make sure that the computer is operating properly. The computer needs to be calibrated (tested for accuracy and adjusted if needed) every 6 months by picking up a load you know the weight of and comparing the actual weight against the computer reading.

Before using the crane, enter the boom/jib and counterweight configuration data into the crane's computer.

Examples of data you may enter into the crane's computer include:

- Boom length
- Operating radius
- Outrigger extension
- Number of falls of rope.



Example of a load meter/crane computer

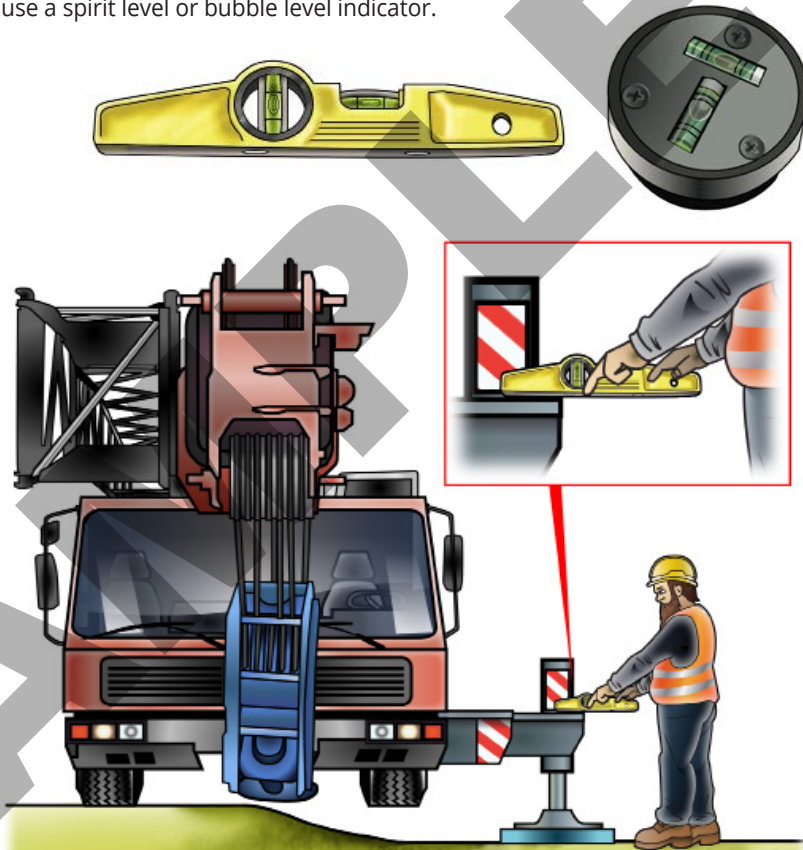
Note:

If the load meter/crane computer shows a value more than the rated load for the empty vehicle, **do not** try to hoist the load as it is. Decrease the working radius so you **do not** overload the crane.

QUESTION 88

How do you check the crane is level?

You can use a spirit level or bubble level indicator.



Element 3 – Perform work / task

Introduction to load charts

This book covers all four slewing mobile crane capacities. You only need to read the sections relevant to the licence you are studying.

60 TONNE TRUCK MOUNTED HYDRAULIC MOBILE CRANE													LOAD CHART 'S'						
CAPACITY LIMITED BY BOOM LENGTH	LOAD RATINGS IN KILOGRAMS												34.75 METRE BOOM W/BOOM EXTENSION						
	OVER SIDE AND OVER REAR WITH OUTRIGGERS POWERFLY BOOM LENGTH IN METRES																		
	11	13	15	17	19	21	23	25	27	29	31	33	34.75	8.0m	12.0m				
3.00	75	80000	73	34800	75	40500	77	46500	79	52500						3.00			
3.50	68	88000	75	47400	79	49500	75	40400	77	37000	79	34000	79	32000		3.50			
4.00	64	44800	68	42100	71	39800	76	38500	77	32000	79	29000	79	25500	80	20400	4.00		
5.00	58	34800	64	33800	67	32150	70	32400	72	32200	74	30000	75	27500	77	25200	78	19900	5.00
6.00	51	29500	58	28400	63	29050	68	27800	69	27200	71	26000	73	25000	74	24000	76	19000	6.00
7.00	44	24800	52	23450	58	23000	62	22800	66	22200	68	22000	70	19800	72	19400	73	17400	7.00
8.00	37	19800	48	19300	54	19120	58	19050	63	18900	65	18800	67	18400	69	17900	71	16500	8.00
9.00	32	14900	38	14370	44	14200	48	14100	52	14000	55	13900	57	13500	61	13000	64	12000	9.00

Load chart

All cranes have their **own** load chart. The load chart gives information about the load capacity of the crane in a given configuration (set up). The cranes capacity changes depending on how the crane is set up.

Configuration

The configuration of the crane includes things like:

- The outrigger set up (if applicable)
- The length and angle of the main boom
- Operating radius
- Maximum line load and winch capacity
- Fly jib and hook attachments.

Important information

Other important information may include:

- Limitations of boom angles
- Operational conditions. For example wind speed.

Crane set-up

A load chart refers to a crane that is set up:

- According to manufacturers specifications
- On firm, level ground
- In ideal weather conditions
- With outriggers/stabilisers fully extended (where applicable)
- Tyres correctly inflated and in good condition.

Read all of the information on the load chart.

How to read a load chart

To calculate the maximum load you can safely lift, there are some basic rules for all load charts. Look at the following **Load chart X**, which is for a 20 tonne hydraulic crane.

Follow the steps:

1. Outriggers

Choose the outrigger set up. This will help you know which section of the load chart to look at. For this example, look at the **Without outriggers** on the chart. The crane is set up to mobile on rubber.

2. Boom length

Choose the length of the boom. This will help you know which column to look at. In this example, we'll use a boom length of 14.06 metres.

3. Operating radius

Choose the operating radius. This will help you know which row to look at. For this example we'll use 4.30 metres. Round up to 4.50 metres.

4. Capacity

Read down the boom length column and across the operating radius row. This is the capacity (WLL) of the crane. In this example it is 5200 kg.

5. Hook block/s

The weight of the hook block/s is part of the load. Deduct the weight from the capacity. These weights are on the load chart. In this example, deduct 200 kg for a 3 sheave hook block.

6. Jib weight

The weight of the jib (fly), either fitted or stowed, is part of the load and may be a deduction from the capacity. This information is on the load chart. In this example, we can't use the jib because we are not using outriggers.

7. Line (hoist rope)

Look at the hoist rope reeving to work out how many parts of line (hoist rope) you need to support the load. In this example, the load being lifted is 5 tonnes. The hoist rope has a capacity of 3340 kg which is less than 5 tonnes so you need 2 lines to safely lift the load.

8. Jib configuration

Find the information about the load capacity of the different jib configurations. This information is in the **Jib load ratings-kgs** on the bottom right-hand side of the chart. With jib offset the crane has more capacity, but the jib is meant to give you more lifting height. Some load charts will have information on auxiliary jibs and their limitations.

Sample Kobelco CKE2500 Crawler Crane over 100 Tone load Chart

Unit: metric ton

Counterweight: 90.0 t, Carbody weight: 24.0 t

45.7 m Boom Length	45.7																Reeves	
	45.7				51.8				57.9				61.0					
	Jib length (m)		45.7		51.8		57.9		61.0		Jib length (m)		61.0					
Working Radius (m)	Boom length (m)		Jib length (m)		Boom length (m)		Jib length (m)		Boom length (m)		Jib length (m)		Boom length (m)		Jib length (m)		Working Radius (m)	
Boom angle	88°	83°	68°	63°	88°	83°	68°	63°	88°	83°	68°	63°	88°	83°	68°	63°	Boom angle	
18.0	28.1																18.0	
20.0	27.8					22.4				18.3							20.0	
22.0	27.5					22.1				18.0				16.3			22.0	
24.0	27.1					21.8				17.7				16.1			24.0	
26.0	26.6	27.6				21.5				17.4				15.9			26.0	
28.0	26.0	27.1				20.6	20.8			17.1				15.4			28.0	
30.0	24.7	26.6				19.6	19.8			16.2	17.0			14.6	15.3		30.0	
34.0	22.5	23.0				17.6	17.9			14.6	15.3			13.2	13.8		34.0	
38.0	20.4	20.0				15.8	16.1			13.2	13.8			12.0	12.5		38.0	
42.0	18.0	17.6				14.0	14.5			12.1	12.5			10.9	11.4		42.0	
46.0	14.7	15.6	48.0 m/11.9			12.4	12.9			11.0	11.4			10.0	10.4		46.0	
50.0	48.0 m/12.8	14.0	11.3			10.8	11.4	52.0 m/10.4		10.1	10.5			9.2	9.5		50.0	
54.0		52.0 m/13.3	10.1	9.3		9.2	10.0	9.8		9.3	9.7	9.6		8.5	8.8	56.0 m/8.9	54.0	
58.0			9.2	8.4		8.5	8.9	8.1		8.4	8.8	8.6		7.5	8.1	8.5	58.0	
62.0			8.3	7.7			8.0	7.3	60.0 m/7.7	7.7	7.8	7.0		5.6	7.5	7.7	64.0 m/6.4	62.0
66.0			64.0 m/8.0	7.0			7.3	6.6		64.0 m/7.0	7.1	6.3		6.6	6.9	6.1	66.0	
70.0							6.6	5.9			6.4	5.6			6.2	5.5	70.0	
74.0								72.0 m/5.6			5.8	5.1			5.6	4.9	74.0	
78.0															4.8	4.4	78.0	
82.0																4.0	82.0	
Reeves			3				2				2				2		Reeves	

QUESTION 143

Some of the Australian standard signals used in dogging are shown here.

What does each of these signals mean?

Hoisting raise



2 short

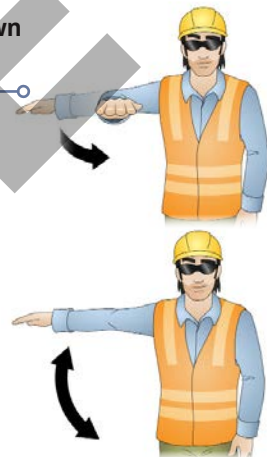


Hoisting lower/down

Commonly used signal (not Australian Standard)



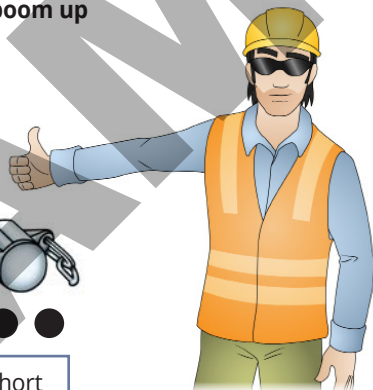
1 long



Luffing boom up



3 short



Luffing boom down



4 short



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READING LOAD CHARTS

FOR CRANES OVER 100 TONNES

Load Chart - 100 Tonne (A)

WARNING

1. Boom backstops are required for all boom lengths.
2. Gantry must be in a rated position for all operating conditions.
3. Boom inserts must be arranged as shown in the 'Boom Insert Arrangement Chart'.
4. Mid-point suspension (centre hitch) required when boom length is 55.5m or longer.
5. Safe loads depend up on ground conditions, boom length, radius of operation and proper handling. All of which must be taken into account by the user.
6. Standard boom hoist rating is 12 parts line.
7. Ratings are based on trawler extended to full jib point. Crawler frames must be fully extended for all crane operations.
8. For main boom ratings, with jib erected not shown, use rating for next longer boom.

Main boom in 360° work area - rated crane loads in kilograms (KGs)

Powered boom lengths in metres

Operating Radius (M)	Powered boom lengths in metres										Operating Radius (M)	
	34	36	40.5	43	46	49	52.5	55.5				
4.00												4.00
5.00												5.00
6.00												6.00
7.00												7.00
8.00												8.00
9.00	80	22,900										9.00
10.00	78	23,000	78	22,900	79	22,800						10.00
10.00	76	19,800	76	19,700	77	19,600	78	19,500	78	19,400		12.00
12.00	73	15,400	74	15,300	75	15,200	76	15,100	76	15,000	78	14,900
14.00	69	12,500	71	12,400	72	12,300	74	12,200	74	12,100	76	12,000
16.00	65	10,400	67	10,300	68	10,200	71	10,100	71	10,000	74	9,900
18.00	61	8,800	63	8,700	64	8,600	67	8,500	67	8,400	71	8,300
20.00	57	7,600	59	7,500	60	7,400	63	7,300	63	7,200	67	7,100
22.00	53	6,700	55	6,600	56	6,500	59	6,400	59	6,300	63	6,200
24.00	49	5,900	51	5,800	52	5,700	57	5,600	57	5,500	59	5,400
26.00	44	5,200	47	5,100	48	5,000	51	4,900	51	4,800	57	4,700
28.00	35	4,700	42	4,600	43	4,500	47	4,400	47	4,300	53	4,200
30.00	31	4,200	33	4,100	34	4,000	37	3,900	37	3,800	43	3,700
32.00			29	3,600	33	3,500	37	3,400	37	3,300	43	3,200
34.00				34	3,200	42	3,100	42	3,000	47	2,900	42
36.00				30	2,900	33	2,800	33	2,700	42	2,600	41
38.00					29	2,400	29	2,300	33	2,200	37	2,100
40.00								29	2,000	29	1,900	29
									1,800	29	1,700	28
									1,600	29	1,500	29
									1,400	29	1,300	28
									1,200	29	1,100	27
									1,000	29	900	26
									800	29	700	25
									600	29	500	24
									400	29	300	23
									200	29	100	22

NOTE: Please read the other 'Reading Load Charts' section before reading this section.

Introduction to load charts



Load chart

All cranes have their **own** load chart. They should be in place and readable. The load chart gives information about the load capacity of the crane in a given configuration (set up). The cranes capacity changes depending on how the crane is set up.

Configuration

The configuration of the crane includes things like:

- The outrigger set up (if applicable)
- The length and angle of the main boom
- Operating radius
- Maximum line load and winch capacity
- Fly jib and hook attachments.

Important information

Other important information may include:

- Limitations of boom angles
- Operational conditions. For example wind speed.

Crane set-up

A load chart refers to a crane that is set up:

- According to manufacturers specifications
- On firm, level ground
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- With outriggers/stabilisers fully extended (where applicable)
- Tyres correctly inflated and in good condition.

Read all of the information on the load chart.

Introduction to load charts

All cranes have their own load chart. The load chart gives information about the load capacity of the crane in a given configuration (set up). The crane's capacity changes depending on how the crane is set up.

The configuration of the crane includes:

- the outrigger set up
- the length and angle of the main boom
- maximum line load and winch capacity
- fly jib and hook attachments.

Other important information can include:

- specific limitations of boom angles
- operational condition such as wind speed.

Read all of the information on the load chart.



Step 1 - Find the right load chart

The first step in reading a load chart is to make sure the load chart you have matches the crane you are using.

You should check the heading on the load chart and make sure it matches the type of crane you are using.

For example, this chart is for a crane which can lift up to 100 tonnes.

Jib Offset Angle: 30°

Unit: metric ton

Counterweight: 90.0 t, Carbody weight: 24.0 t

Jib length (m)	27.4				36.8				45.7				54.9				Jib length (m)
	12.2	18.3	24.4	30.5	12.2	18.3	24.4	30.5	12.2	18.3	24.4	30.5	12.2	18.3	24.4	30.5	
14.0	14.1 m/18.3				15.3 m/18.3												14.0
16.0	16.7				18.2					17.7 m/18.2							16.0
18.0	17.9	13.5			18.7	18.4 m/13.5				19.1				16.9 m/18.2			18.0
20.0	18.8	13.5	21.9 m/8.2		18.1	13.5				18.7	21.9 m/13.5			19.0			20.0
22.0	15.9	13.1	8.2		17.2	13.5	21.5 m/8.1			18.2	13.5			18.6	22.8 m/13.5		22.0
24.0	15.2	12.6	7.8	25.3 m/4.4	16.4	13.1	8.1			17.4	13.4	25.1 m/8.1		18.2	13.5		24.0
26.0	14.5	12.0	7.6	4.4	15.7	12.8	7.9	23.3 m/3.3		16.7	13.2	8.0		17.6	13.4	26.7 m/8.1	26.0
28.0	13.9	11.4	7.4	4.2	15.1	12.3	7.6	4.3	18.1	12.8	7.8	23.9 m/4.4		17.0	13.2	8.0	28.0
30.0	13.4	10.9	7.2	4.1	14.6	11.8	7.4	4.2	15.6	12.5	7.6	4.3	16.4	12.9	7.8	30.6 m/4.3	30.0
34.0	12.7	10.0	6.8	3.8	13.7	10.9	7.1	4.0	14.8	11.8	7.3	4.1	15.5	12.2	7.5	4.2	34.0
38.0	12.0 m/12.4	9.4	6.5	3.7	13.0	10.2	6.8	3.8	13.9	10.9	7.0	3.9	14.7	11.5	7.2	4.0	38.0
42.0		9.0	6.2	3.5	12.6	9.6	6.5	3.6	13.5	10.3	6.7	3.7	14.0	10.9	6.9	3.8	42.0
46.0		84.0 m/8.9	6.1	3.3	11.8 m/12.1	9.2	6.3	3.5	12.8	9.8	6.5	3.8	13.2	10.4	6.7	3.7	46.0
50.0			6.1	3.3		8.9	6.1	3.4	12.1	9.4	6.3	3.5	11.4	9.9	6.5	3.6	50.0
54.0		16.1 m/8.1	3.0		11.8 m/8.9	6.1	3.5	10.7 m/11.7	9.1	6.2	3.4	9.9	9.5	6.4	3.5	54.0	
58.0				16.2 m/2.9			6.1	3.1		8.9	6.1	3.3	8.6	9.2	6.2	3.4	58.0
62.0									50.0 m/8.9	6.1	3.3	11.8 m/12.1	8.2	6.1	3.3	62.0	
66.0								64.1 m/2.8		10.0 m/6.1			7.2	6.0	3.2	66.0	
70.0												2.9	67.7 m/6.4	6.0	3.2	70.0	
74.0												72.8 m/2.8		13.0 m/3.3	3.1	74.0	
78.0															2.9	78.0	
82.0															23.9 m/2.8	82.0	
Reverses	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	Reverses

CRANE CHART CALCULATIONS

Look at crane charts in the Trainer's Resources in the Easy Guides 'Start-up Pack for Mobile Slewing Cranes (over 100T)'.

The crane charts include:

- CO LOAD CHART_KOBELCO CKE2500-2
- CO LOAD CHART_GROVE GMK5130-2

Answer the questions related to these crane charts. Your trainer will check your answers.

Element 4 – Pack up

Shut down and pack up

This part of the book is about how to shut down, pack up and put away equipment.

It covers:

- Stowing and securing equipment
- Using motion locks
- Shutting down the crane
- Post-operational checks.

Stow boom/jib and equipment

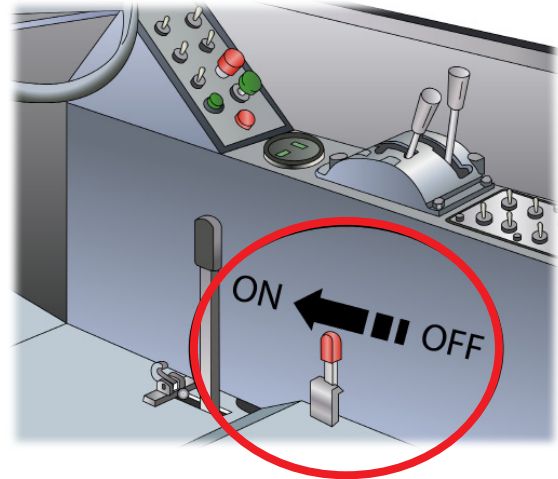
Stow your boom as shown in the manufacturer's instructions or the specifications.

Remove any lifting parts from the boom and securely attach them to the correct position on the vehicle.



Apply motion locks and brakes

Check that you have turned on all motion locks and brakes.

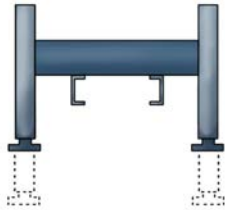


Stow and secure outriggers/stabilisers

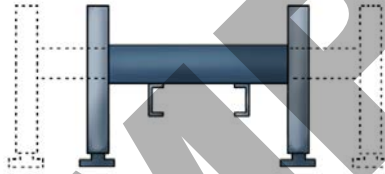
Check that outriggers/stabilisers are stored safely for travel.

To secure and stow outriggers you should:

1. Use the controls to raise the outrigger footplates.



2. Use the controls to retract the outriggers.



3. Pack up the packing timbers.



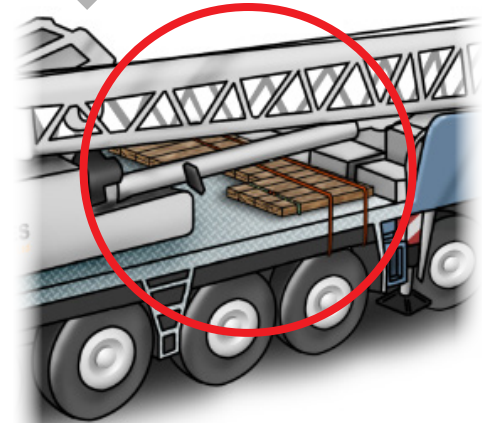
4. Clean steel plates.



Stow and secure plates and packing

Secure all packing properly and safely.

Use straps or ties to hold packing timbers down.



Leaving the crane unattended

If you leave the crane for a long time you should:

- Secure (lock) the crane
- Raise the hook to a safe height
- Turn off the crane power (if possible).

When you leave the crane unattended overnight:

- Remove the load
- Shut the crane down according to the manufacturer's instructions.



Unattended loads

Do not leave a load hanging from the crane hook after shutdown or when the crane is left unattended.

It can cause winch or boom creep (AS 2550).

