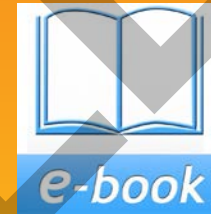


VEHICLE LOADING CRANE SAFETY AND LICENCE GUIDE



Training support material for:

TLILIC0024

**Licence to operate a
vehicle loading crane**

(capacity 10 metre tonnes and above)



Produced by:

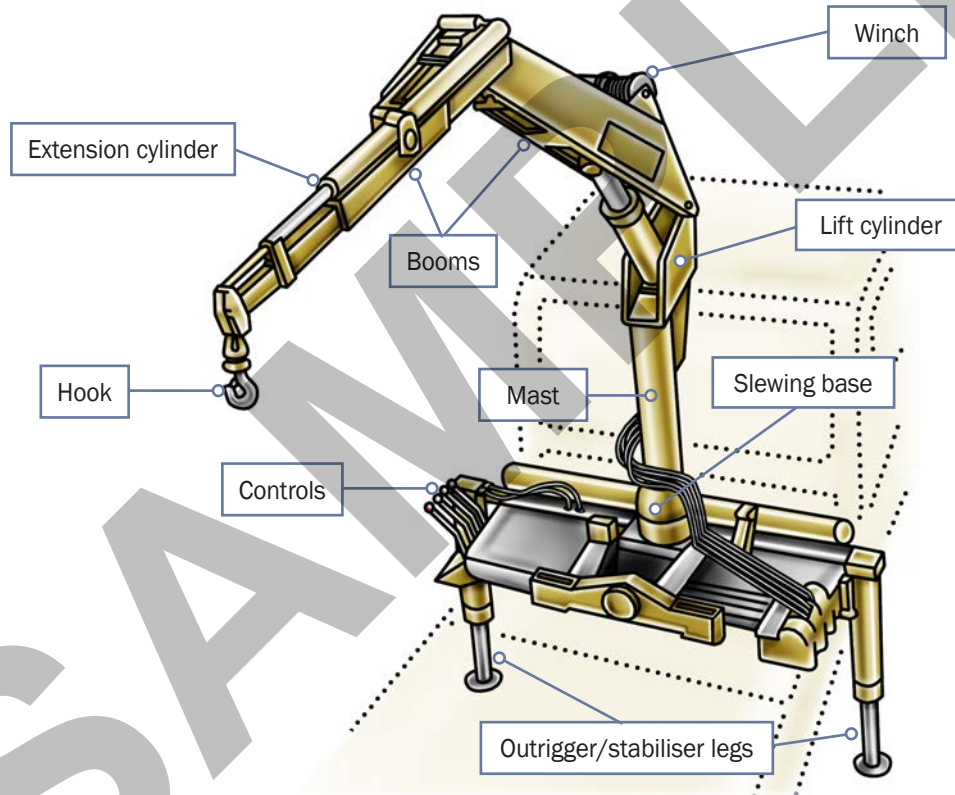


CONTENTS

About this guide	4
Introduction to vehicle loading crane	5
High risk licensing and the law	11
Element 1 Plan work / task	15
Element 2 Prepare for work / task	91
Element 3 Perform work / task	183
Element 4 Pack up	213

What is a vehicle loading crane?

A vehicle loading crane is a crane which is mounted to a vehicle for loading and unloading. Vehicle loading cranes have hydraulic booms with power supplied from the vehicles engine through a PTO (power take off).



10 metre tonnes

A High Risk Work licence is needed when the vehicle loading crane has a capacity of 10 metre tonnes or more. The metre tonnage of a vehicle loading crane is a number which is worked out by multiplying the lifting capacity by the working radius of the boom for that lifting capacity.

To calculate 10 metre tonnes

MULTIPLY THE SWL × THE WORKING RADIUS FOR THAT SWL = METRE TONNES

from the centre line of slew to the centre line of hook. This calculation must be done for each Safe working load (SWL) on the load chart.

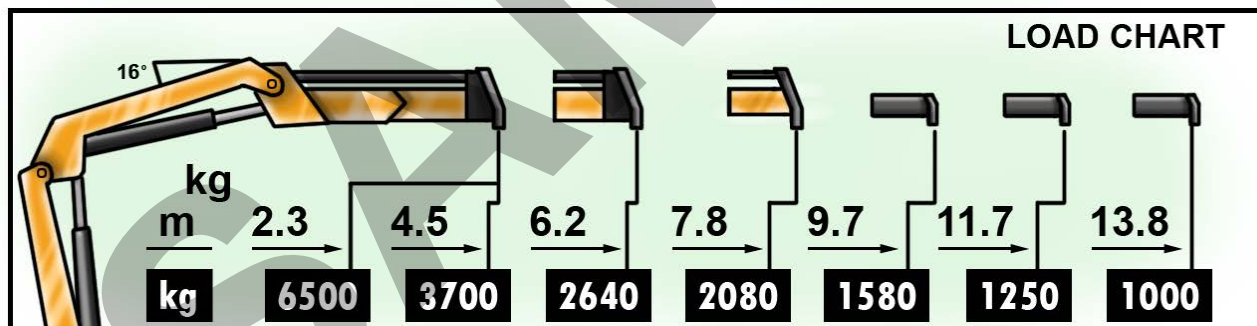
If any one calculation amounts to 10 metre tonnes lifting capacity or greater, the crane operator will require the appropriate High Risk Work Licence.

For example

The load chart below indicates the crane can lift 1300 kilograms at 8.5 metres.

$$1300 \text{ kg} \times 8.5 \text{ m} = 11,050$$

— as this is greater than 10,000 a HRW Licence is required to operate the crane.



Does the operator of a VLC need a dogging licence?

A dogging HRW Licence or one of the three rigging HRW Licences is required by:

- Any person, other than a licenced VLC operator, who **exercises judgment** in the estimation of a load or selection of the slinging method and lifting gear when slinging a load on any VLC, or
- Any person who directs any VLC operator in the movement of the load when the load is out of view of the crane operator.

To exercise judgment means:

- Selecting the slinging method by considering the shape of the load
- Selecting the lifting gear by determining the weight (its mass) and centre of gravity of the load, and
- Inspecting the lifting gear to ensure it is not defective by considering its condition.

The vehicle loading crane HRW licence includes the application of load estimation and slinging techniques to move a load competently. **Holders of a vehicle loading crane HRW licence can exercise judgment on the load and slinging method and select and inspect the lifting equipment when operating a vehicle loading crane.**

The holder of a vehicle loading crane HRW licence **cannot**:

- Exercise judgement or inspect lifting gear for any other class of crane unless they hold the relevant HRW licence
- Operate the VLC if the load is out of view
- Direct another VLC operator in the movement of a load when the load is out of the operators view.

For further information see the Safe Work Australia website – www.swa.gov.au



HIGH RISK LICENSING AND THE LAW

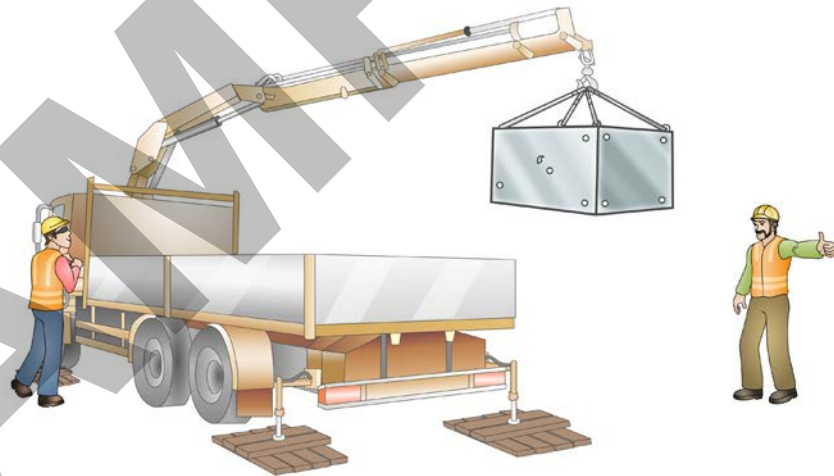


QUESTION 1

You have your high risk work licence. If you are going to work using an unfamiliar crane, what must your employer do?

Your employer must make sure that you have:

- information about the crane
- training on the crane
- instruction on how to use the crane
- you are supervised while getting used to the new crane.



PLAN WORK

Element 1

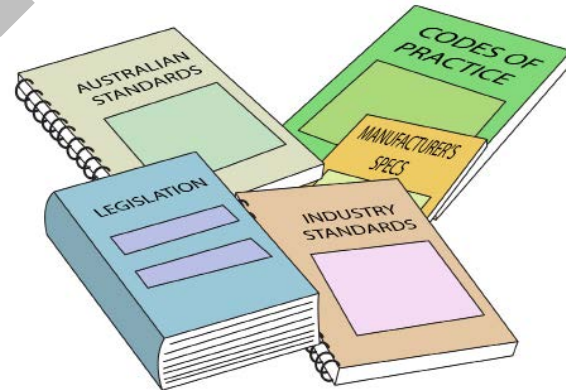


OHS / WHS Guidelines, instructions and people

Before operating the crane you must be aware of any guidelines, instructions and people for the crane you will be operating and for crane operation in general at the workplace.

The types of documents you may need to refer to include:

- Manufacturers instructions such as an operator's manual
- Safe work or job procedures
- Specific workplace policies and procedures
- OHS / WHS workplace representatives
- Plans by managers
- Codes of practice
- WHS /OHS policy
- Health and Safety Acts and Regulations (OHS/WHS)
These can be found at www.safeworkaustralia.com or on your state/territory Health and Safety Regulators website.
- Australian and industry standards
You can search for standards at www.standards.org.



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

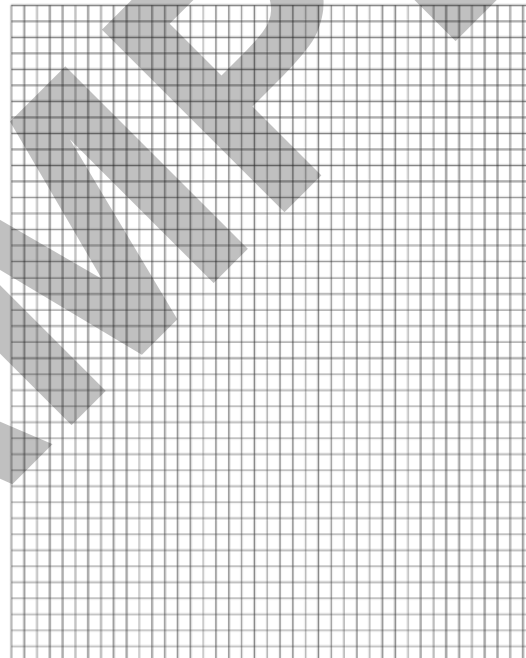
1. Project Details:		Version No:		
Candidate Name:		Site Pick up address:		
Operator Contact Details / Supervisor		Site Drop off Address:		
Crane make / model		Crane ID		
Lift 1 Description				
Lift 2 Description				
Lift 3 Description				
Lift 4 Description				
Item Details				
Weight of Load	Kg	Kg	Kg	Kg
Weight of rigging	Kg	Kg	Kg	Kg
Weight of hooks	Kg	Kg	Kg	Kg
Additional Weight	Kg	Kg	Kg	Kg
Total*	Kg	Kg	Kg	Kg
Boom Length	M	M	M	M
Boom sequence				
Line pull	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg
Parts of line	M	M	M	M
Hook block WLL	Tonne / kg	Tonne / kg	Tonne / kg	Tonne / kg
Pick up radius	M	M	M	M
Set down radius	M	M	M	M
Max radius	M	M	M	M
RC at Max radius	Kg	Kg	Kg	Kg
Communication Method	H 2WR W	H 2WR W	H 2WR W	H 2WR W
* 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



Crane lift plans are essentially overviews of safety risks that may occur and precautions that will be taken when completing the haul.

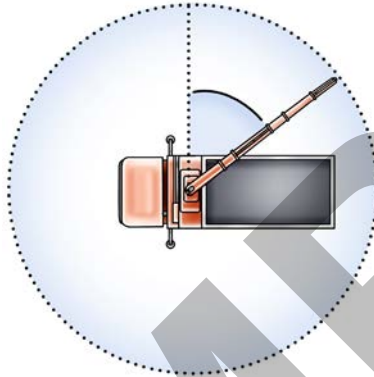
Crane lift plans look at the size and weight of the haul as well as how far items are being moved and what sort of environment they are moving in.

QUESTION 2

You have some lifting jobs to do.

What should you think about and plan for?

Boom safe working radius



Things that might get in your way



How you will get in (access) and out (egress) of the work area



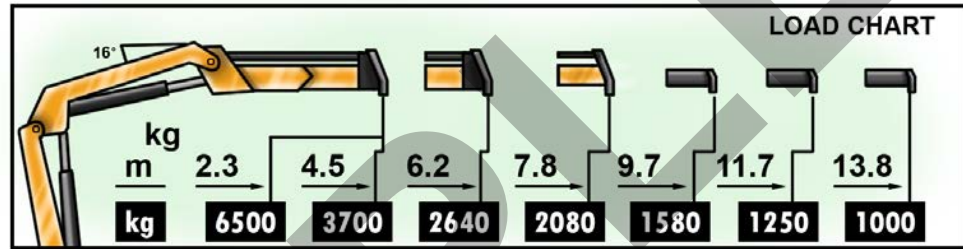
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QUESTION 2**...CONTINUED FROM PREVIOUS PAGE**

You have some lifting jobs to do.

What kinds of things should you think about and plan for?

The load weight and size. Capacity of the crane.

**Boom deflection.**

How do you compensate for boom deflection?

The crane operator can then release the load by lowering the boom/jib slightly to compensate for any boom deflection. The boom will spring up when the load is released as the deflection releases from the boom. Make sure there is a safe distance from any obstructions before releasing the load.

QUESTION 3

Who might you talk to about site hazards before you start the job?

Supervisors, managers and team leaders



Workmates



Workplace health and safety representatives and safety committee members.



Workplace engineers.



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Ground conditions

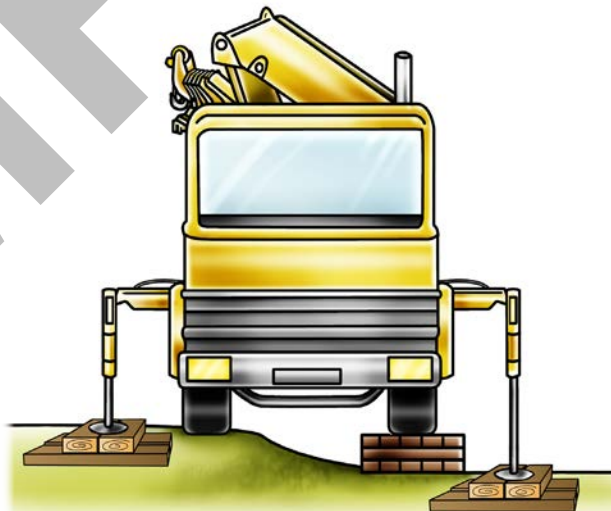
Choosing the set-up location

It is important to check the ground stability before starting to work. Check the ground to see if it is firm enough to support the crane and equipment. Check the ground is firm and level to keep the crane stable while you move or drive the load.

You should check the ground for recently filled trenches as the ground may be soft and the crane may sink when you use it.



Check that the crane can be set up level. Don't use the crane unless it is level. Also check that the boom can move through its full range of movement without hitting overhead electric power lines or other obstacles.



QUESTION 12

...CONTINUED FROM PREVIOUS PAGE

You've already planned for site hazards.

What other things do you plan for before using the crane?

Safe work procedures



What equipment do you need? Is it available?



Do you need any permits or licenses?

WORK PERMIT				
JOB: Remove electric motor and gearbox		LOCATION: Top of crusher 'B'		
Date started: _____		Date completed: _____		
Name	Task	Time on	Signature on	Signature off
Fred Jones	Isolate power and confirm safe	7:35 am	Fred Jones	Fred Jones
Ron Walker	Disconnect power	8:10 am	R Walker	R Walker
Batry Smythe	Digger remove motor	8:25 am	B Smythe	
Pat Kicker	Trades assistant	8:25 am	P A Kicker	

Does the crane have enough capacity to carry the load? Check the data plate.



...CONTINUES ON NEXT PAGE

QUESTION 12

...CONTINUED FROM PREVIOUS PAGE

You've already planned for site hazards.

What other things do you plan for before using the crane?

Do you need a dogman/rigger or a tag line?



Condition, weight and size of load.



The cranes movement sequence



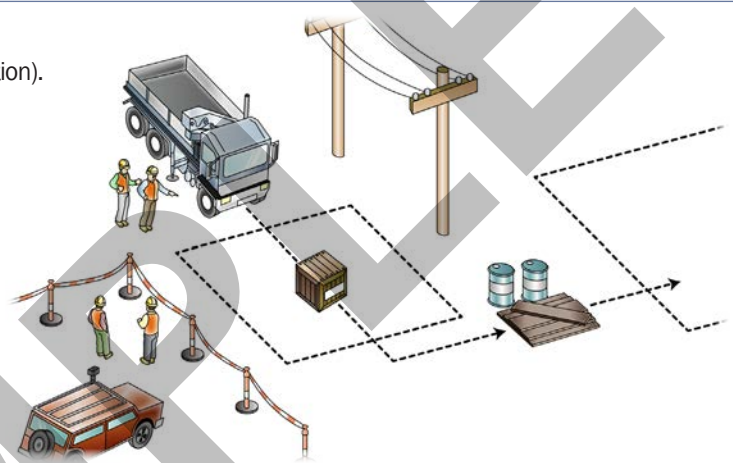
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QUESTION 12**...CONTINUED FROM PREVIOUS PAGE**

You've already planned for site hazards.

What other things do you plan for before using the crane?

Travel requirements
(distance, speed and direction).



Slinging methods. The load must be balanced and secure.



QUESTION 13

You are using a vehicle loading crane near uninsulated powerlines. Working near powerlines is **very** dangerous and can kill you.

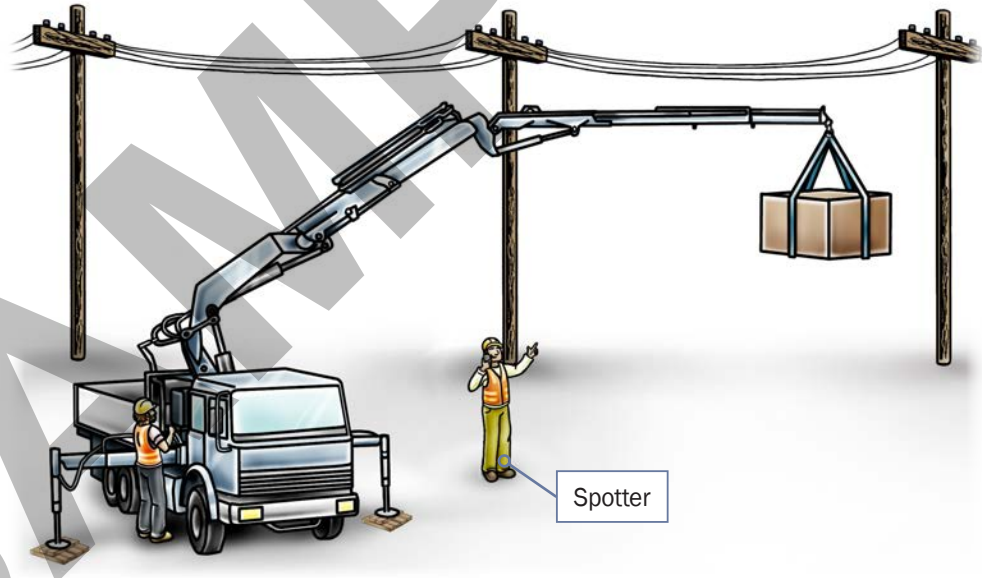
What are the minimum safe approach distance rules you **must** follow?

Approach distance is the minimum distance any part of the crane can go near live powerlines. The minimum safe distance rules you must follow can be different for each state/territory. For example, only some use spotters.

A **spotter** is someone who helps you work closer to powerlines [Check if this is allowed in your state/territory].

Uninsulated means the powerlines have no cover. If you touch them you could be hurt or killed.

Most states and territories use Australian Standard AS [See next page/slide.]

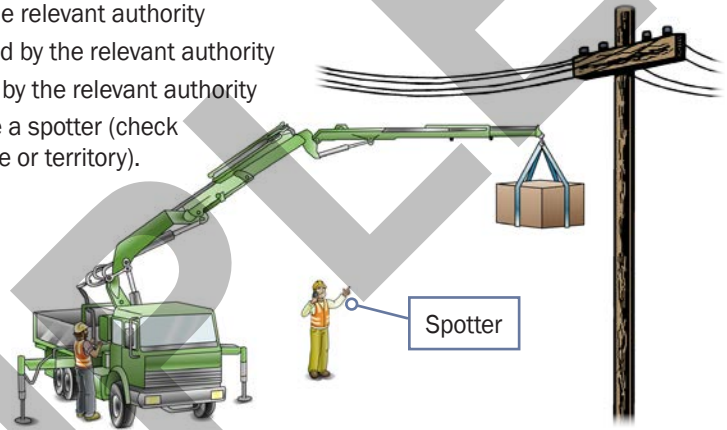


QUESTION 14

You need to work closer to powerlines than the minimum safe distance.

What do you need to do?

- Get permission from the relevant authority
- Get power disconnected by the relevant authority
- Get the lines insulated by the relevant authority
- You may be able to use a spotter (check legislation for your state or territory).

**QUESTION 15**

Whose job is it to find out the weight of the load that the crane is going to lift?

This person would also be qualified to inspect lifting equipment associated with a VLC High Risk Work licence.

LOAD CHART							
kg	2.3	4.5	6.2	7.8	9.7	11.7	13.8
m	6500	3700	2640	2080	1580	1250	1000



A vehicle loading crane operator with a High Risk Work licence or a dogger or rigger who holds a High Risk Work licence. The VLC operator must give information about the cranes capacity.

Angle factors

Greater angle = greater tension

Tension develops in each sling at different included angles. The greater the sling angle the greater the WLL of the slings you will need to use.

For general work

90 degrees is the recommended maximum angle between two legs of a sling for general work. 120 degrees is the maximum allowed angle between two legs of a straight sling lift.


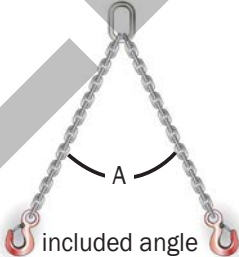
To work out the SWL, you multiply the WLL of the sling by the angle factor.

Formula:






Safe Working Load (SWL) = WLL × Angle Factor

So, the greater the angle, the less you can lift.



Alloy Grade T or 80 Chain Sling			
2, 3 or 4 Leg Slings			
			
Chain size (mm)	Included Angle		
	60	90	120
6.0	1.9	1.6	1.1
7.0	2.6	2.1	1.5
8.0	3.5	2.8	2.0
10.0	5.5	4.5	3.2

Methods of attachment

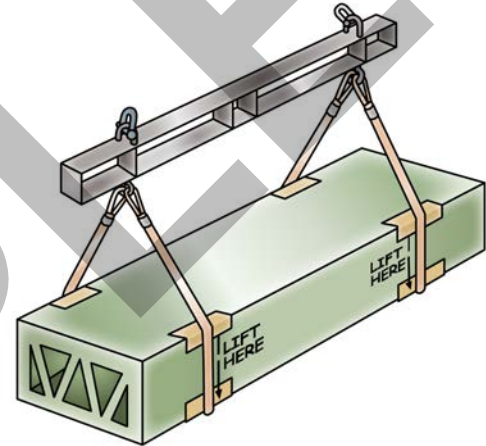
Type of attachment	Load shape	Load factor
Basket		= 2 Note: A single sling with vertical legs doubles the load factor on a round load.
Basket		= 1 Note: The corners of the load creates a nip point which reduces the capacity of the sling by 50%. Thus 50% of a load which originally had a load factor of 2 (see round load) is now reduced to a load factor of 1.
Single sling		= 1 Note: The load factor is one.
Reeve/choke		= 0.5 Note: The lifting capacity of the sling is reduced by 50%. Due to the corners of the load creating nip points.
Reeve/choke		= 0.75 Note: The lifting capacity of the sling is reduced by 25%.

QUESTION 30

You need to work out the right lifting points for a load.

When must you do this?

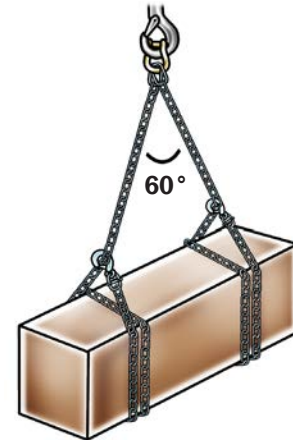
Before slinging the load.

**QUESTION 31**

A two legged sling has been reeved around a load.

What is the maximum angle allowed between the two legs of the sling?

60 degrees.



QUESTION 32

A FSWR sling is choke hitched around a round load.

What is the load factor?

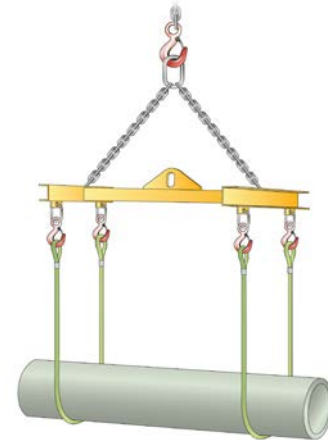
The load factor of this load is 0.75.

**QUESTION 33**

A sling is basket hitched around a round load.

What is the load factor?

The load factor is 2.

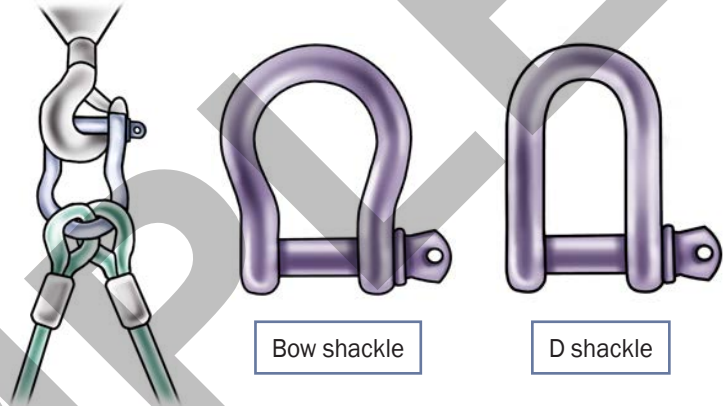


QUESTION 34

You will be doing a lift where you need to use shackles.

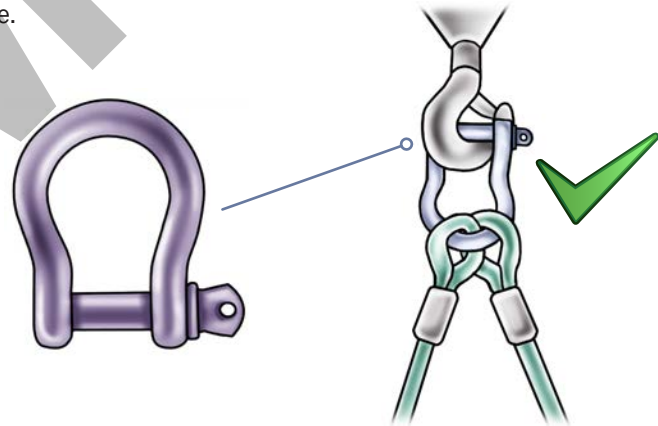
What kinds of shackles can you use?

You can use a bow shackle or a D shackle.

**QUESTION 35**

For supporting two or more slings what kind of shackle should you use?

You should use a bow shackle.



QUESTION 36

What information should be clearly marked on a shackle?

Information on the shackle should include:

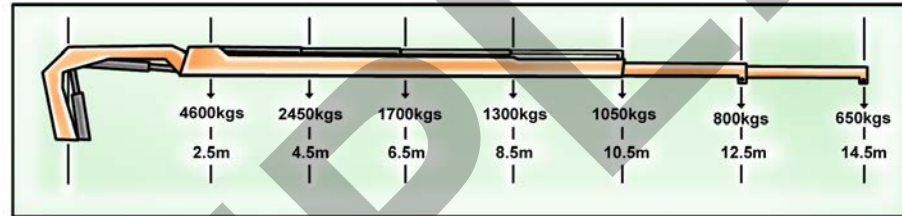
- Working load limit (WLL)
- Manufacture's identification
- Quality Grade, M or 4, S or 6
- Identification marking to match the shackle to the test certificate.



QUESTION 37

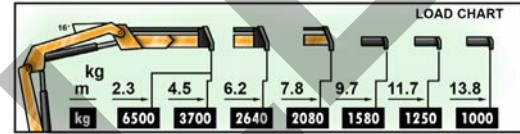
Why is it important to find the load chart on the crane and make sure it is readable?

The crane chart will tell you what the crane can do (capability) and how much (capacity) it can lift. ***It is the crane operator's job to make sure the crane has the capacity to lift the load.***



What type of information is included in the owners manual or operators manual?

- The way we should use the equipment or operate and interpret e.g. load chart.
- How we should maintain the equipment.
- How to inspect that machinery and its parts.
- How to store the equipment.



Instructions on how to use the equipment, lift features.



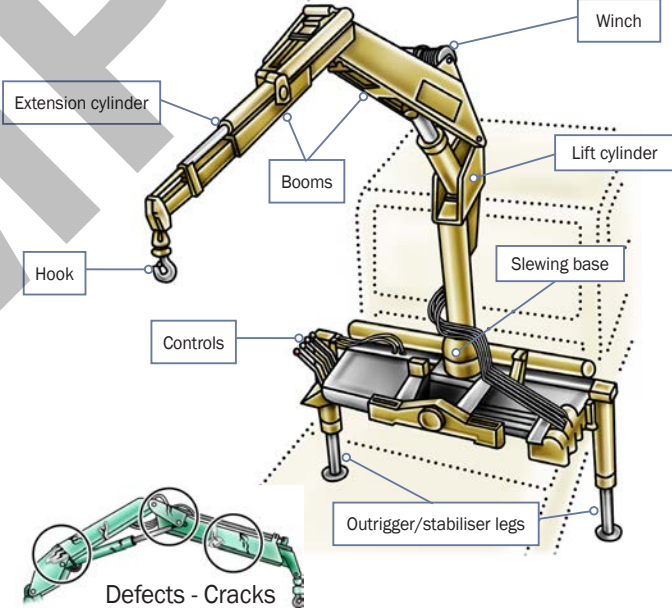
Check your manual for storage requirements.

Maintain the equipment by checking all fluid levels (oil, water, fuel, hydraulic fluid). Check for leaks.



Inspect machinery and its parts

Check if there are any defects with the vehicle loading crane.



PREPARE FOR WORK / TASK

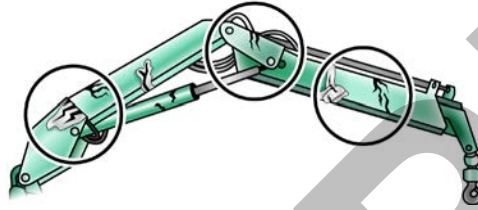
Element 2



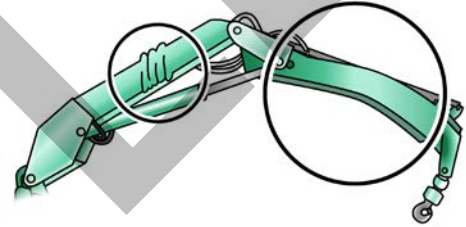
QUESTION 47

Name some defects you can easily see on a crane's boom.

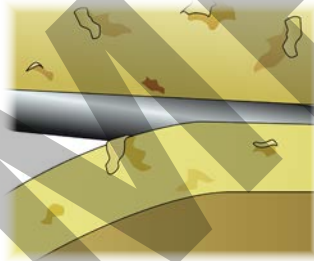
Cracked welds or metal in the boom or superstructure.



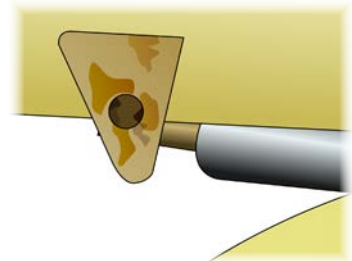
Twists or bends



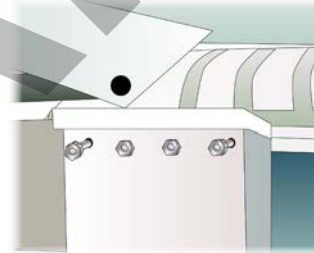
Flaking paint



Rusty welds or joints



Loose bolts

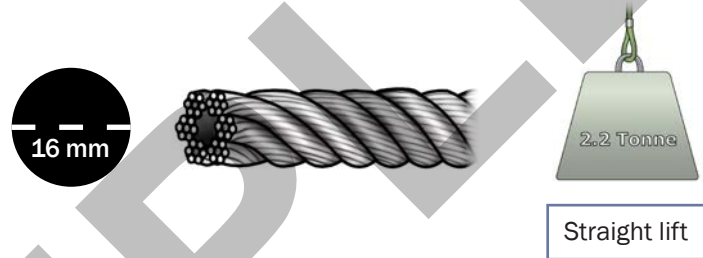


Oil leaks



How sling angles changes the sling capacity

When you use a FSWR sling for a **straight lift** it can lift to its full Working load limit (WLL).

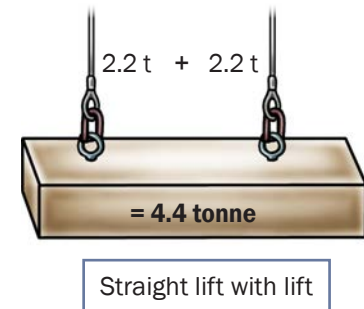
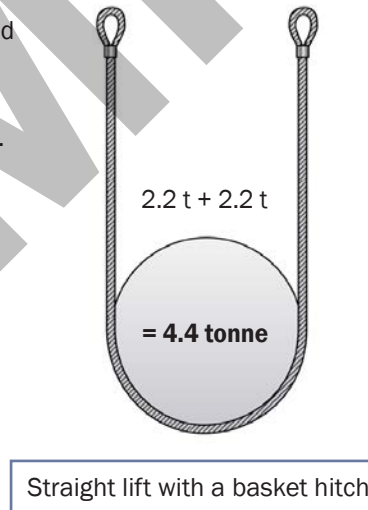


When you straight lift with two slings or basket hitch around a round load with one sling you can lift double the WLL of the sling.

For example, a 16 mm FSWR sling has a WLL of 2.2 tonne.

The 16 mm FSWR can now lift 4.4 tonne.

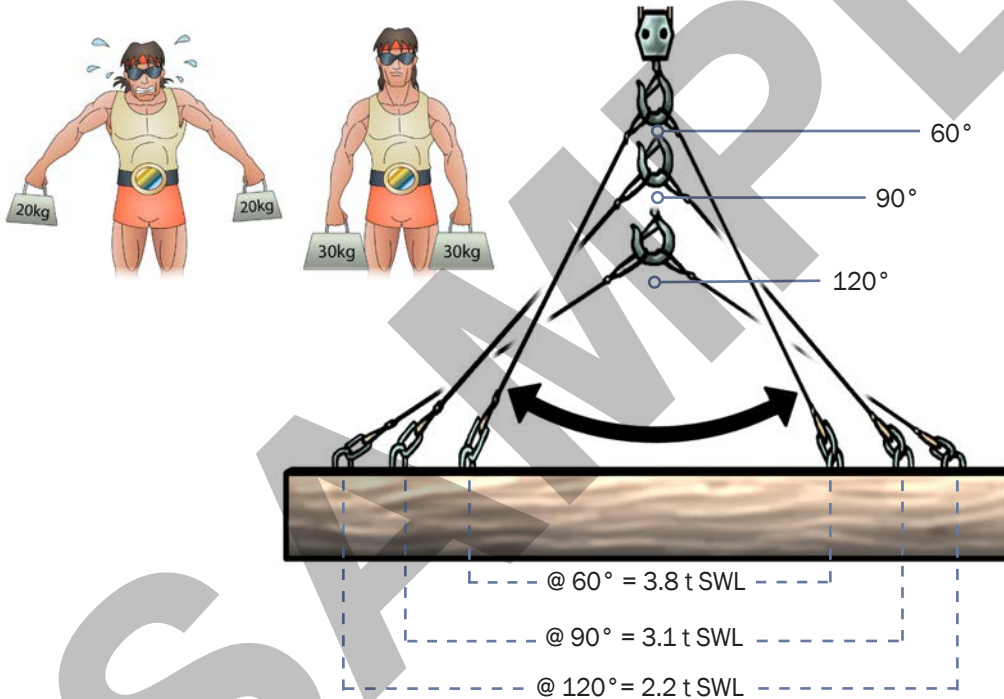
Each sling is supporting half the weight (2.2 t).



How sling angles changes the sling capacity (continued)

When you use two slings at an angle, each sling has more force on it.

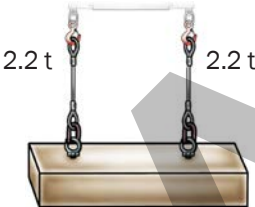
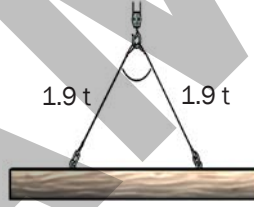
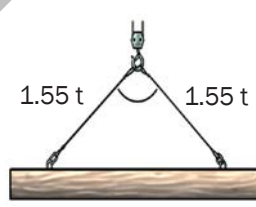
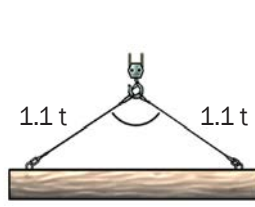
This means the slings cannot lift as much weight. As the angle goes up, the amount you can lift goes down.



Common angles for lifting

This chart shows you some common angles for lifting. We call the angles the **included angle**.

Each included angle has an angle factor. The angle factor is the number you use to work out how much you can safely lift. This is called the Safe Working Load (SWL).

Included Angle	Straight Lift (2 Slings)	60°	90°	120°
Angle Factor	2	1.73	1.41	1.0
Example: 16 mm FSWR WLL 2.2 tonne	$2.2 \times 2 = 4.4 \text{ t}$ 	$2.2 \times 1.73 = 3.8 \text{ t}$ 	$2.2 \times 1.41 = 3.1 \text{ t}$ 	$2.2 \times 1 = 2.2 \text{ t}$ 

Using slings at an angle – What size sling do you need?

Chain

$$D = \sqrt{L \text{ (kg)} \div 0.4 \div G \text{ (80)} \div \text{angle factor}}$$

Example:

Load = 3200 kg

Included angle = 90°

$$D = 3200 \div 0.4 \div 80 \div 1.41 = 70.92$$

$$D = \sqrt{70.92} = 8.42$$

D = 8.42 (Rounded up to 9 mm)



Note:

$$D = 3200 \div 32 \div 1.41 = 70.92$$

$$D = \sqrt{70.92} = 8.42$$

D = 8.42 (Rounded up to 9 mm)

FSWR

$$D = \sqrt{L \text{ (kg)} \div 8 \div \text{angle factor}}$$

Example:

Load = 1600 kg

Included angle = 90°

$$D = 1600 \div 8 \div 1.41 = 141.84$$

$$D = \sqrt{141.84} = 11.9$$

D = 11.9 (Rounded up to 12 mm)



Fibre Rope

$$D = \sqrt{L \text{ (kg)} \div \text{angle factor}}$$

Example:

Load = 200 kg









Included angle = 90°

$$D = 200 \div 1.41 = 141.84$$

$$D = \sqrt{141.84} = 11.9$$

D = 11.9 (Rounded up to 12 mm)

Grade (T) 80 Working Load Limits (tonnes)

Chain  Diameter mm	Single leg slings			Slings of 2, 3, or 4 legs						Endless slings			
	 Straight sling	 Adjustable sling	 Reeved sling	 Straight sling			 Reeved sling			 Basket sling			 Reeved sling
				60°	90°	120°	60°	90°	120°	60°	90°	120°	
6	1.2	0.95	0.95	1.9	1.6	1.1	1.6	1.3	0.95	1.6	1.3	0.95	1.9
7	1.6	1.2	1.2	2.6	2.1	1.5	2.0	1.7	1.2	2.0	1.7	1.2	2.4
8	2.0	1.5	1.5	3.5	2.8	2.0	2.6	2.1	1.5	2.6	2.1	1.5	3.0
10	3.2	2.4	2.4	5.5	4.5	3.2	4.1	3.4	2.4	4.1	3.4	2.4	4.8
13	5.4	4.0	4.0	9.4	7.6	5.4	7.0	5.7	4.0	7.0	5.7	4.0	8.1
16	8.2	6.1	6.1	14.2	11.6	8.2	10.6	8.7	6.1	10.6	8.7	6.1	12.3
20	12.8	9.6	9.6	22.2	18.1	12.8	16.6	13.6	9.6	16.6	13.6	9.6	19.2
22	16.0	12.0	12.0	27.8	22.7	16.0	20.8	17.0	12.0	20.8	17.0	12.0	24.1
26	20.6	15.5	15.5	35.8	29.2	20.6	26.8	21.9	15.5	26.8	21.9	15.5	31.0
32	32.8	24.6	24.6	56.8	46.3	32.8	42.6	32.7	24.6	42.6	34.7	24.6	49.2

Maximum Safe Working Loads in tonnes of 1000 kg under general conditions of use.

- DO NOT EXCEED SAFE WORKING LOAD
- DO NOT EXCEED 120°
- SWL at 60° must never be exceeded, even at smaller angles

IMPORTANT INSTRUCTIONS ON THE USE OF ALLOY GRADE T(80) CHAIN SLINGS

SAFETY WARNING OF HAZARDOUS CONDITIONS

Extreme care should be taken when using the Grade T(80) Chain Slings in close proximity of high temperature. It is therefore recommended that the user make ample provisions for reduced Safe Working Loads.

TEMPERATURE CONTROL





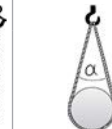
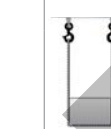
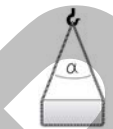






-30°C to 200°C No reduction in SWL
200°C up to 300°C Reduce SWL by 10%
300°C up to 400°C Reduce SWL by 25%
Do not use above 400°C

ACIDIC CONDITIONS

Alloy Grade T(80) slings should not be used in acidic solutions nor in any other corrosive environment.

GALVANISING

Alloy chains and fittings should not be hot-dip galvanised nor electro-plated as the Safe Working Load is reduced by 20% after galvanising.

Manufactured to AS1666					Safety Factor 5:1														
Wire rope slings																			
Method of loading		Direct load	Choke hitch		Basket hitch						Direct loaded			Choke hitch					
			Round load	Rectangular load	Round load			Other than round load			Direct loaded			Round load		Other than round load			
Rope																			
Nominal diameter mm	Minimum breaking force kN																		
Included angle		-	-	-	0°	60°	90°	120°	0°	60°	90°	120°	0° to 60°	90°	120°	0° to 45°	0° to 60°	0° to 45°	0° to 60°

Safe working loads in tonnes

Safe working loads under general use with 1570 grade wire and fibre core with ferrule-secured eyes

8	28.2	0.55	0.41	0.27	1.09	0.94	0.77	0.55	0.55	0.48	0.39	0.27	0.94	0.77	0.55	0.71	0.48
9	35.6	0.69	0.52	0.34	1.38	1.19	0.97	0.69	0.69	0.60	0.49	0.34	1.19	0.97	0.69	0.90	0.60
10	44.0	0.85	0.64	0.43	1.70	1.47	1.20	0.85	0.85	0.74	0.61	0.43	1.47	1.20	0.85	1.11	0.74
11	53.2	1.03	0.77	0.52	2.1	1.78	1.45	1.03	1.03	0.90	0.73	0.52	1.78	1.45	1.03	1.34	0.90
12	63.3	1.23	0.92	0.61	2.5	2.1	1.73	1.23	1.23	1.07	0.87	0.61	2.1	1.73	1.23	1.59	1.07
13	74.3	1.44	1.08	0.72	2.9	2.5	2.0	1.44	1.44	1.25	1.02	0.72	2.5	2.0	1.44	1.87	1.25
14	86.2	1.67	1.25	0.83	3.3	2.9	2.4	1.67	1.67	1.45	1.19	0.83	2.9	2.4	1.67	2.2	1.45
16	113	2.2	1.64	1.09	4.4	3.8	3.1	2.2	2.2	1.90	1.55	1.09	3.8	3.1	2.2	2.8	1.90
18	143	2.8	2.1	1.38	5.5	4.8	3.9	2.8	2.8	2.4	1.97	1.38	4.8	3.9	2.8	3.6	2.4
20	176	3.4	2.6	1.70	6.8	5.9	4.8	3.4	3.4	3.0	2.4	1.70	5.9	4.8	3.4	4.4	3.0
22	213	4.1	3.1	2.1	8.3	7.1	5.8	4.1	4.1	3.6	2.9	2.1	7.1	5.8	4.1	5.4	3.6
24	253	4.9	3.7	2.5	9.8	8.5	6.9	4.9	4.9	4.3	3.5	2.5	8.5	6.9	4.9	6.4	4.3
26	297	5.8	4.3	2.9	11.5	10.0	8.1	5.8	5.8	5.0	4.1	2.9	10.0	8.1	5.8	7.5	5.0
28	345	6.7	5.0	3.3	13.4	11.6	9.4	6.7	6.7	5.8	4.7	3.3	11.6	9.4	6.7	8.7	5.8
32	450	8.7	6.5	4.4	17.4	15.1	12.3	8.7	8.7	7.6	6.2	4.4	15.1	12.3	8.7	11.3	7.6

QUESTION 99

Calculate the maximum load of a sling when a 2 Leg angle sling configuration is used with the following specifications given?

Specifications

if load is 1000 kg

7m = L = Length of sling leg

5m = H = Height distance from pick point.

Formula:

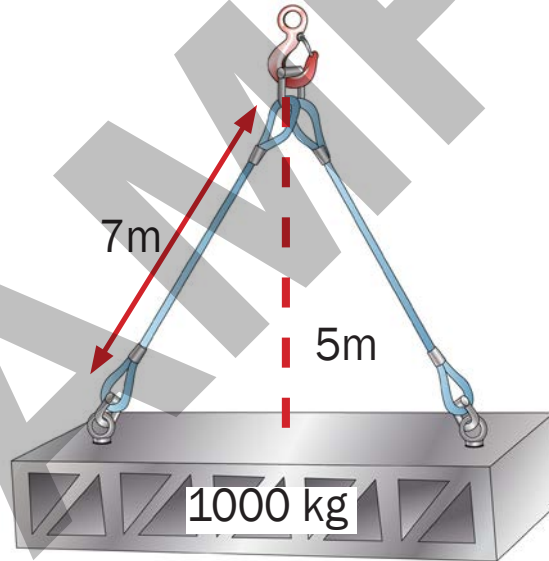
$$=(\text{Load Weight} / \text{No sling Legs}) \times (L / H)$$

Calculation is:

$$=(1000 \text{ kg} / 2) \times (7/5)$$

$$=500 \text{ kg} \times 1.4$$

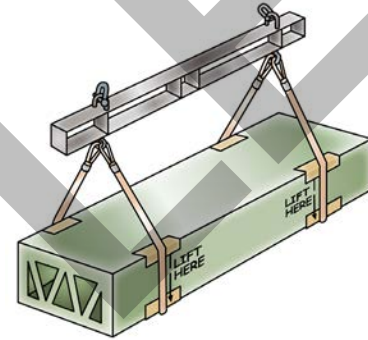
$$= 700 \text{ kg per sling}$$



Lifting or slinging points on a load

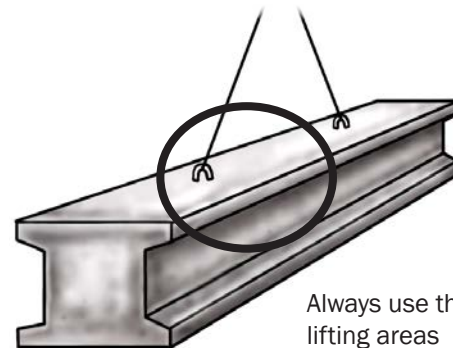
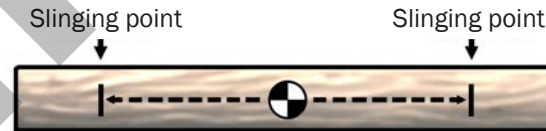
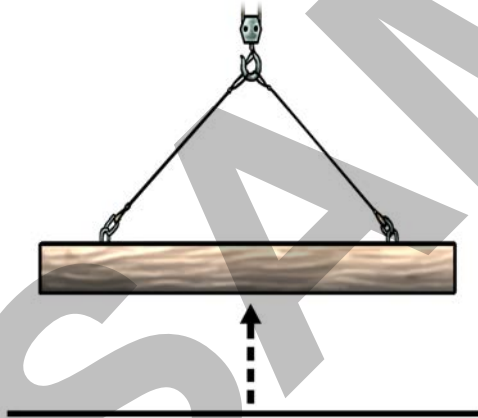
Some loads have specific areas they must be lifted by. These areas may be re-enforced to help distribute the weight evenly when it is being lifted.

Check for manufacturer's specifications/markings on the load. If the load has set points for lifting gear they will be marked by decals (symbols) or writing.



To work out the safe lifting/sling points you can:

1. Measure the distance from the centre out to the sling points. Make sure the weight is evenly distributed.



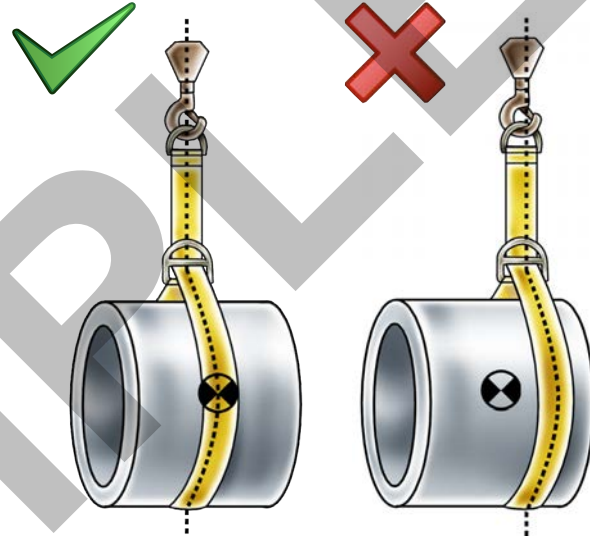
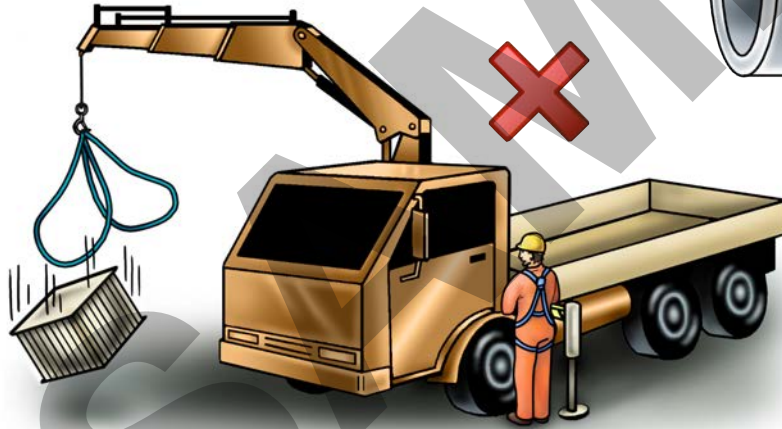
Always use the correct lifting areas

Position the hook above the load

The crane hook needs to be positioned directly above the load centre of gravity and the lifting gear connected.

If the load is not over the centre of gravity the load may try to tip, be sniggered (dragged) or swing when lifted clear of the ground.

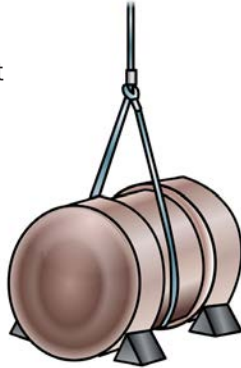
Do a test lift to make sure the load is balanced, the slings are connected correctly and the load is safe to lift.



Prepare load destination (continued)

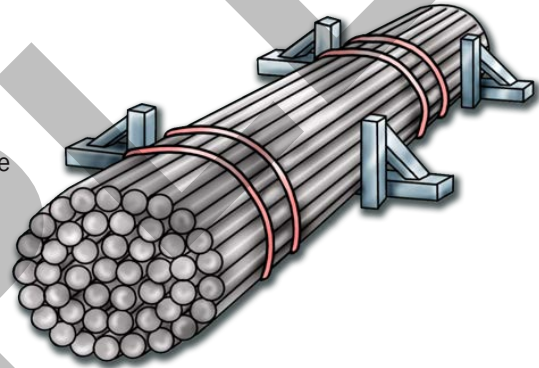
Chocks

If the load is round you may need to set up chocks to hold the load in place when you remove the lifting gear.



Dunnage

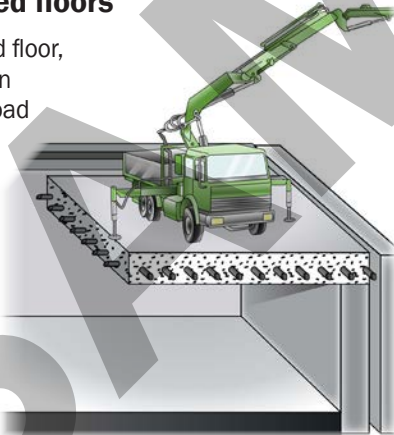
You may need to lay down dunnage (timber supports) to protect the load, make it easier to remove the slings, and help stop damage to the lifting gear.



Loading on suspended floors

If loading onto a suspended floor, make sure that the floor can support the weight of the load and equipment.

You may need to check with an engineer for this information.

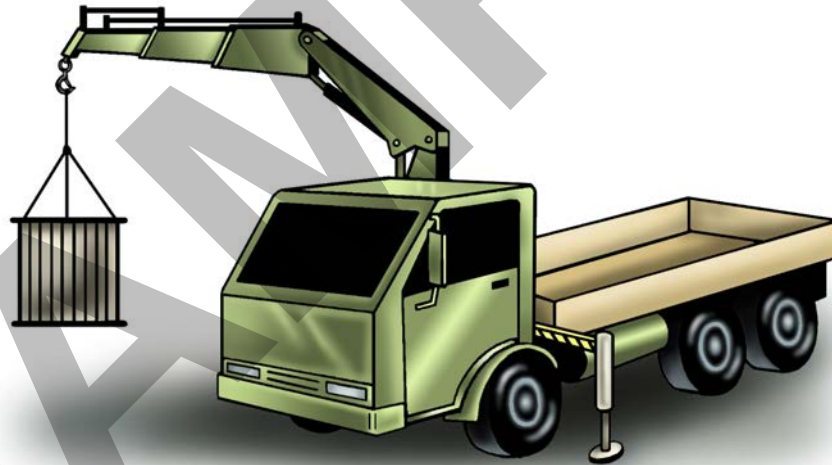


Do not land a load on a suspended or concrete floor without checking with an engineer or site personnel first. The floor may collapse under the weight of the load.

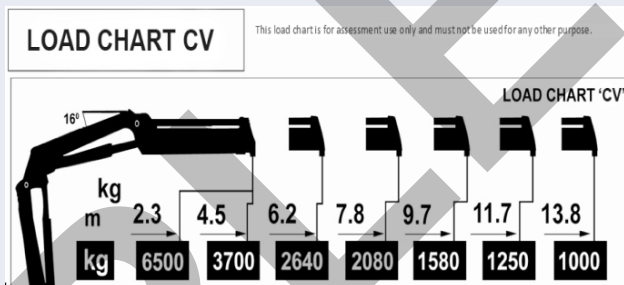


PERFORM WORK / TASK

Element 3



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 (the maximum wind velocity that a vehicle loading crane is capable of safely operating in).

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

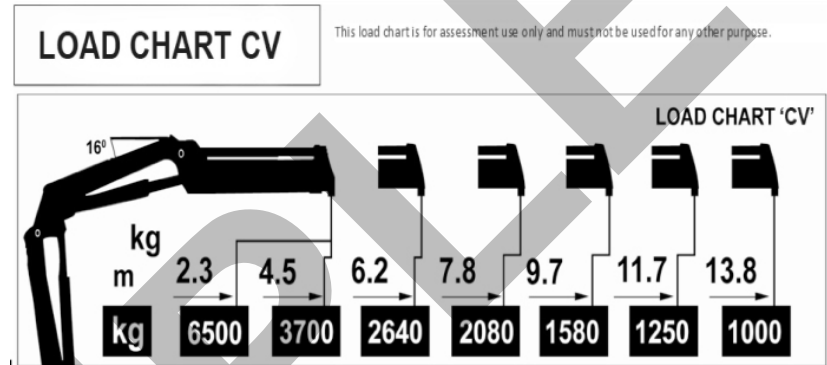
Find the information about the load capacity of the different jib configurations. This information is in the **Jib load ratings-kgs** on the bottom right-hand side of the chart. With jib offset the crane has more capacity, but the jib is meant to give you more lifting height. Some load charts will have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

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 10 tonnes or more.



EXAMPLES OF READING A CRANE CHART

Note: The following crane chart exercises use the CV load chart. This is located in the 'Trainer's Value Pack' of the Easy Guides' training material. Your trainer will provide you with this crane chart.

EXAMPLE OF CALCULATIONS

Question 1

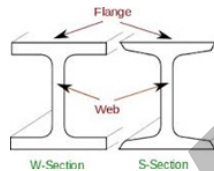
Method used to calculate the approximate weight of a steel universal beam.

You need to calculate the cubic meter of steel for the two components that make up the beam. These are the “Flange” and the “Web” (See diagram 1b)

This done by using the following formula; Width x Depth x Length (W x D x L)



(Diagram 1a)



(Diagram 1b)

Example: Top and Bottom Flanges:

Width – 250 millimetres

Depth – 12 millimetres

Length – 12.5 metres

Web:

Width – 350 millimetres

Depth – 35 millimetres

Length – 12.5 millimetres

Calculation:

Make sure to convert all measurements to metres because volume is measured in cubic metres (m³).

Note: Structural steel weighs 7840kg/m³.

Remember to calculate what is in the brackets first.

Continued on next page

For top and Bottom Flanges

$$\begin{aligned}
 &= 2 (W \times D \times L) \times \text{weight of steel } 7840\text{kg/cu mtr} \\
 &\quad 2 (0.250\text{m} \times 0.012\text{m} \times 12.5\text{m}) \times 7840\text{kg/m}^3 \\
 &\quad 2 (0.0375\text{m}^3) \times 7840\text{kg/m}^3 \\
 &\quad = 0.075\text{m}^3 \times 7840\text{kg/m}^3 \text{ (m}^3 \text{ cancel out)} \\
 &= 588 \text{ kgs}
 \end{aligned}$$

Weight of Web =

$$\begin{aligned}
 &W \times D \times L \times \text{weight of steel } 7840\text{kg/cu mtr} \\
 &(0.350\text{m} \times 0.035\text{m} \times 12.5\text{m}) \times 7840\text{kg/m}^3 \\
 &(0.153125\text{m}^3) \times 7840\text{kg/m}^3 \text{ (m}^3 \text{ cancel out)} \\
 &= 1200.5 \text{ kgs}
 \end{aligned}$$

Total weight of Beam

$$= 588\text{kg} + 1200.5\text{kg} = 1788.5 \text{ kgs}$$

Question (a) What is the weight of 6 of these beams, answer to the nearest whole tonne?

Answer: = weight of 1 beam x 6

$$\begin{aligned}
 &= 1788.5\text{kgs} \times 6 \\
 &= 10731\text{kgs}
 \end{aligned}$$

Continued on next page

Question (b) Using the load chart CV provided are you permitted to lift 6 beams at once?

Answer: = No

Question (c) Using the load chart CV provided at what radius is the crane permitted to lift 2 beams?

Answer: = weight of 1 beam x 2
= 1788.5kgs x 2
= 3577kgs
= The crane will safely lift the weight to a radius of 4.5m

Question 2

Using Load Chart CV what is the maximum load that can be raised on the hook if it is configured as follows.

- 8 metre radius
- Boom horizontal
- Set up on the outriggers

Answer: = 1580kg

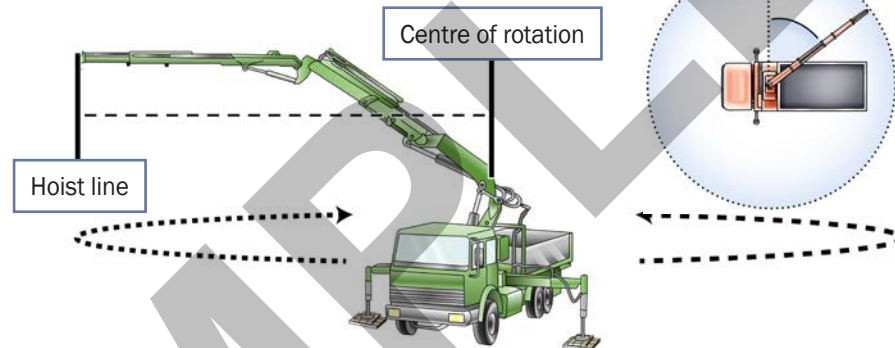
QUESTION 111

You are looking at the crane load chart.

What does **operating radius** show?

Note: When the operating radius is not shown on the load chart use the longer. This reduces the crane capacity.

The operating radius shows you the distance at which the crane can safely lift a known weight.

**QUESTION 112**

Name some things you will find on a load chart.

- The winch line pull
- The crane's rated capacity for different configurations
- The hook block's mass/weight
- Multiple rope fall capacities (eg. 2-fall and 4-fall hook block configurations)
- Operating radius

