

# **NOTES ON LIFTING COURSE**

## **AREA'S TO BE COVERED**

1. Health and safety under English Law
2. Weight & centre of gravity
3. Correct equipment for the job
4. Inspection
5. Fitting the equipment
6. The lift
7. Setting the load down safety
8. Tidy up

**Course by:**

**P. Morrall**

# 1. Health and safety under English Law

## 1.1 The employers responsibilities

## 1.2 The employees responsibilities

## 1.3 Inspection of lifting tackle & cranes

### 1.1 The employers responsibilities

In Section 2 of the health and safety at work act 1974 it says:

#### Duties of Employers to Employees

(1) It is the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees. An employer must do this by providing:

(2) (a) A safe plant and systems of work:

- (b) The safe use, handling, storage and transport of articles and substances;
- (c) Necessary information, instruction, training and supervision;
- (d) A safe place of work including safe access and egress;
- (e) A safe working environment.

### 1.2 The employees responsibilities

In Section 7 and 8 of the health and safety at work act 1974 it says:

#### Duties of Employees

It is the duty of every employee whilst at work to take reasonable care for the health and safety of himself and to co-operate with his employer so far as is necessary to enable them to carry out their statutory duty.

Section 8            No person shall interfere or **misuse** anything provided in the interest of health and safety

### 1.3 Inspection of lifting tackle & cranes

No lifting machine or tackle shall be taken and used for the first time unless it has been tested and a certificate of test and examination issued. The certificate is to be kept on site and entered into the site register of approved lifting equipment. On this site all approved lifting equipment is given an LPL number this is marked onto the item

Lifting tackle is to be inspected by a competent person every six months and lifting machines every 14 months. On this site a colour coding system is used to identify equipment that has been inspected and the current colour is marked on the lifting tackle stores.

## 2. Weight & Centre of Gravity

### 2.1 Weight

#### 2.11 Item marked

#### 2.12 Ask or fined out

### **NO ITEM IS TO BE MOVED USING LIFTING MACHINERY OR TACKLE WITHOUT FIRST FINDING OUT THE WEIGHT OF THE ITEM**

### 2.1 Weight

#### 2.11 Item marked

In some case you are lucky in the fact that the item to be move may have a plate or label attached to the side of the item telling you the actual weight. You should look for this first, before doing anything else.

#### 2.12 Ask or find out

If the item is not marked or labelled then check the weight stated on any documentation. Ask your supervisor or someone who may have moved the item earlier and they should know the weight of the item.

To find out the estimated weight of the item. This can be done using tables of weights and calculating the volume of the item. The following table gives the weight for some common materials.

### Weight of materials

<b>MATERIAL</b>	<b>WEIGHT IN KILOGRAMS PER CUBIC METRE</b>	<b>WEIGHT IN POUNDS PER CUBIC FOOT</b>
Aluminium	2700	170
Brass	8500	530
Brick	2100	130
Coal	1450	90
Copper	8800	550
Concrete	2400	150
Earth	1600	100
Iron-Steel	7700	480
Lead	11200	700
Magnesium	1750	110
Oil	800	50
Paper	1120	70
Water	1000	62
Wood	800	50

**Estimated weight = Volume x Weight per cubic metre**

### 3. Correct equipment for the job

There several different types of lifting equipment and there are different ways of using them . They must all be used correctly.

#### **SLINGS**

**Belt sling** can be used in two ways, either in a vertical straight line or looped. They should not to be choked or twisted as this will reduces the safe working load.

**Fibre round slings** are a most versatile sling can be used in a vertical straight line, looped, choked and rapped around the job.

**Wire rope slings** can only to be used in vertical straight line lift.

**Chain slings** can be used in vertical straight line lift, looped or rapped around the job

#### **EYEBOLTS**

**Dynamo eyebolts** can only be used in vertical lifts

**Collar eyebolts** may be used for vertical lifts, or angled lifts where the direction of the lifting force is in the same plane as the eye of the eyebolt and at an angle of not greater than 45 degrees

#### **SHACKLES**

**Dee shackle** only to be used in vertical straight line lifts

**Bow shackle** can be used for vertical lifts, or angle lifts at an angle of not greater than 45 degrees

#### **CHAIN BLOCKS**

To be used in a straight line free from twists and knots

#### **TIRFORS**

To be used in a straight line with the correct cable and lever handle

#### **CRANES**

To be used for lifting and not pulling loads

## 4. Inspection

### **ALL LIFTING TACKLE TO BE VISUALLY INSPECTED BEFORE BEING USED**

#### **Markings**

All lifting tackle and machinery should have the following markings;

A serial or test certificate number

A LPL number

A S.W.L. (safe working load) or this may be marked as W.L.L (work load limit)

Other marking you may see are;

Proof load this is two times the safe working load

M.B.L. Minimum Breaking load

**ALL LIFTING TACKLE TO CHECKED FOR THE LPL NO. AND S.W.L. BEFORE BEING USED**

**ANY LIFTING TACKLE OR MACHINERY FOUND DAMAGED OR FAULTY IS TO BE LABELLED SCRAPPED AND REPORTED TO P. MORRALL**

#### **DAMAGE TO LOOK FOR :**

**Belt sling** Check for cuts and tears in the fabric and damaged stitching on the eyes

**Fibre round sling** Inspect outer protection for cuts and tears, if there are any fibres showing the sling must not to be used

**Wire rope sling** Check for kinks, broken wires, correct formation of the lifting eye and the swage ferrules are correctly fitted

**Eyebolts** Check for damage to the threads, correct length of thread and it is not bent also no cracks or cuts in the metal

**Shackles** Check the pin for being bent or the thread for damage also make sure it is the correct pin for that shackle and the shackle itself is not bent. A good test is, if the pin screws into the shackle correctly and freely the shackle is not bent.

**Chain blocks** Check the lifting chain for elongation wear on links, wear or damage from the chain being dragged along the floor also check that joining pins are correctly fitted. The hooks for elongation and safety catches are fitted correctly

**Tirfors** Inspect the steel rope for damage check it is the correct diameter for the tirfor, check that it functions correctly and you have the correct lever handle

**Cranes** Check all the working movements of the crane before using it to lift any load

**IF ANY DAMAGE FOUND OR IF IN DOUBT DO NOT USE IT**

## 5. Fitting the equipment

Fitting the lifting tackle incorrectly will either damage the lifting tackle or produce an unsafe lift, hence it is important to decide how you will lift before selecting the tackle. This will enable you to select the correct lifting tackle for the job

## 6. The lift

1. First take the strain and check the lifting tackle is functioning correctly
2. lift the object about three inches (75 mm) off the ground and again check the lifting tackle and check for an even lift
3. If all checks are o.k. then continue with the lift

During some lifting operations it will be necessary to have an operator (the person controlling the lifting machinery) and a rigger (the person controlling the lift) in which case it will be necessary to use hand signals.

**ENSURE NO PERSON IS UNDER THE LOAD AT ANY TIME**

## 7. Setting the load down safety

The load should be lowered gently on to the ground and not dropped or bounced causing shock loading on the equipment.

The area should be clear and free from people.

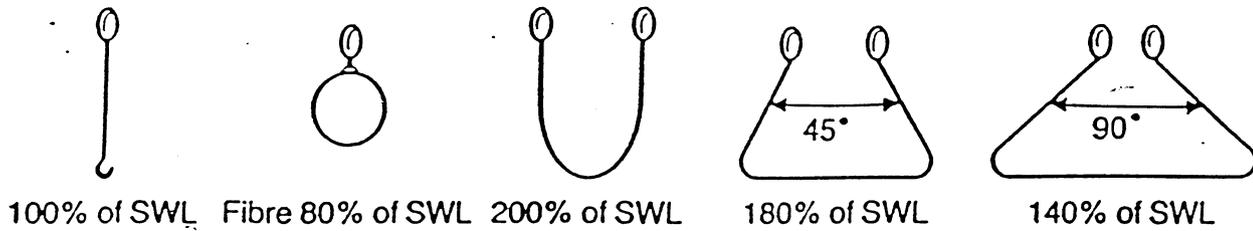
The load should not be lowered on to anything that is unstable, likely to cause damage to the load or damage to the lifting tackle.

## 8. Tidy up

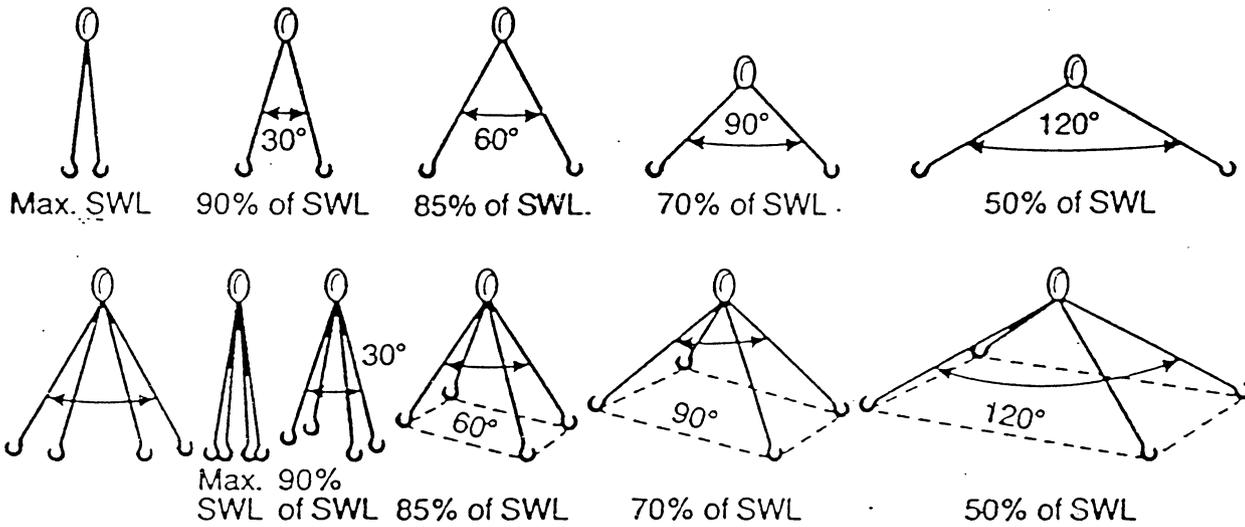
Once the load is safely down and the operation completed the crane should be returned to its parked position and the lifting tackle removed from the job. The lifting tackle must now be re-inspected for any damage, once inspected the lifting tackle must be returned to the correct storage area. Any damaged equipment should be reported straight away and taken out of service.

**FIG. 34.9 Maximum safe working loads for slings at various angles**

**SINGLE LEG** Chain 50% of SWL



**MULTI-LEG** Multi-leg slings are generally stamped SWL at 90°

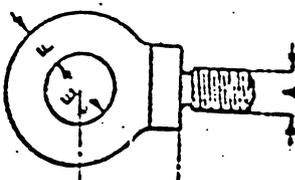
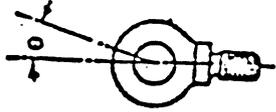


Select the correct size of a sling for the load taking into account the included angle and the possibility of unequal loading in the case of Multi-leg slings

Sling angle	Distance apart of legs	Sling leg angle	Tension in leg (tonnes)
30°	½ leg length	90°	0.7
60°	1 leg length	120°	1.0
90°	1½ leg length	151°	2.0
120°	1¾ leg length	171°	6.0

BRITISH STANDARD EYEBOLTS

		Safe Working Load							
		θ=0°		θ=15°		θ=30°		θ=45°	
A	F	E	G	T.	C.	T.	C.	T.	C.
ins.	ins.	ins.	ins.						
3/8	11/32	9/16	3/4	5	2 1/2	1 1/2	1 1/2	1 1/2	1 1/2
1/2	7/16	3/4	1	10	5 1/2	3 1/2	3 1/2	3 1/2	2 1/2
5/8	9/16	15/16	1 1/4	18	10	6 1/2	6 1/2	6 1/2	4 1/2
3/4	21/32	1 1/8	1 1/2	1	8	10 1/2	10 1/2	10 1/2	7
7/8	25/32	1 5/16	1 3/4	2	0	15	15	15	10
1	7/8	1 1/2	2	2	15	11	11	11	13 1/2
1 1/8	1	1 11/16	2 1/4	3	10	0	5	5	17
1 1/4	1 3/32	1 7/8	2 1/2	4	10	11	13	13	2
1 1/2	1 5/16	2 1/4	3	6	10	14	8	8	12
1 3/4	1 17/32	2 5/8	3 1/2	9	0	2	6	6	4
2	1 3/4	3	4	12	0	16	8	8	0
2 1/4	1 31/32	3 3/8	4 1/2	15	0	10	10	10	14
2 1/2	2 3/16	3 3/4	5	20	0	7	7	7	19
3	2 5/8	4 1/2	6	30	0	0	0	0	8





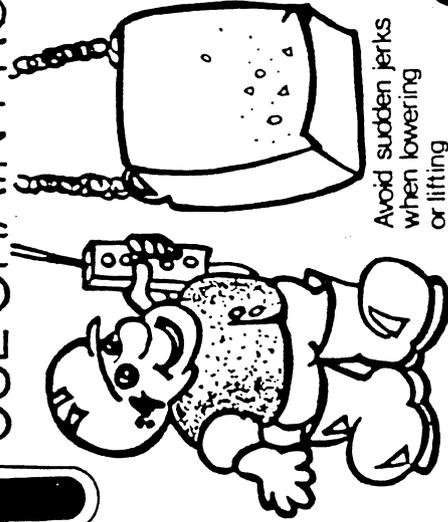
**HULL BEKESIDE LIFTING  
SERVICES LTD**

eastern  
security  
south humberside  
tel (01724) 711043

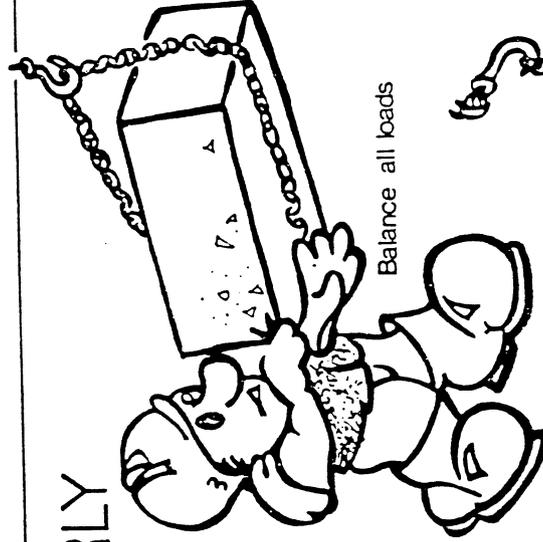
15 monks way  
lincoln  
tel (0522) 514640

# SLINGING SAFETY

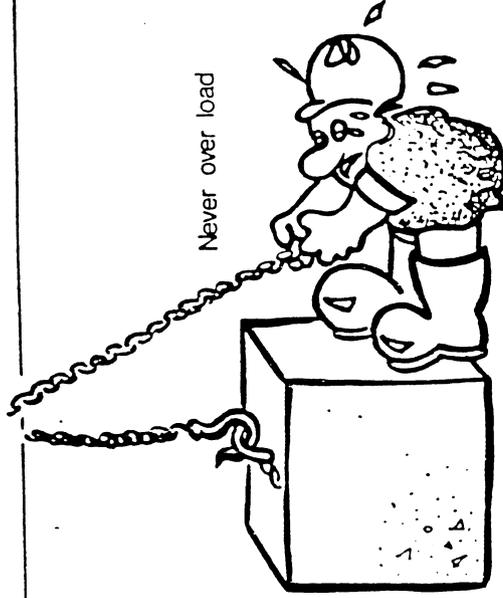
## USE CHAIN PROPERLY



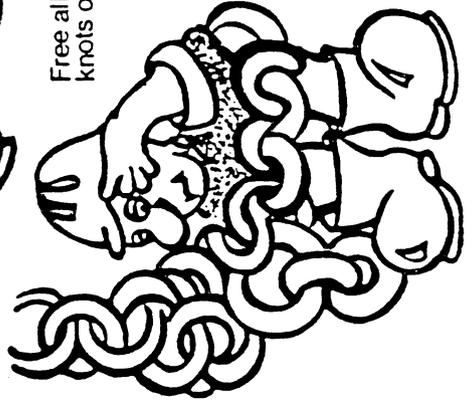
Avoid sudden jerks  
when lowering  
or lifting



Balance all loads



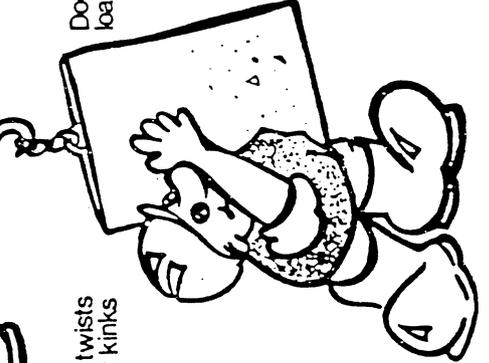
Never over load



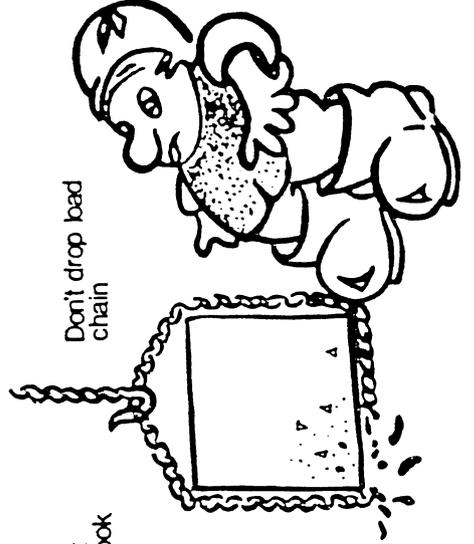
Free all twists  
knots or kinks



Use pads around  
sharp corners



Don't point  
load the hook



Don't drop load  
chain



# HUMBERSIDE LIFTING SERVICES LTD.

Unit 3, Ealand Industrial Estate, Ealand,  
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Tel: (0724) 711043  
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Round Slings	Single Part Sling	Endless & Duplex Sling	Vertical x 1	Choke x 0.8	Straight Basket x 2	Basket @ 90' x 1.4	Basket @ 120' x 1
Average Dia in mm	Width in mm	Width in mm	kg	kg	kg	kg	kg
*	25	*	500	400	1,000	700	500
18	50	25	1,000	800	2,000	1,400	1,000
*	75	*	1,500	1,200	3,000	2,100	1,500
20	100	50	2,000	1,600	4,000	2,800	2,000
*	125	*	2,500	2,000	5,000	3,500	2,500
22	150	75	3,000	2,400	6,000	4,200	3,000
25	200	100	4,000	3,200	8,000	5,600	4,000
27	250	125	5,000	4,000	10,000	7,000	5,000
32	300	150	6,000	4,800	12,000	8,400	6,000
38	*	200	8,000	6,400	16,000	11,200	8,000
46	*	250	10,000	8,000	20,000	14,000	10,000
58	*	300	12,000	9,600	24,000	16,600	12,000

## WEB SLING COLOUR CHART

## Safety hints for rigger and slingers

**Rigger** a trained competent person who can calculate the weight and centre of gravity of a load and select the correct equipment for the job.

**Slinger** a trained competent person who can attach the lifting equipment to the job and signals to the crane operator.

1. Make daily checks and do not use any defective lifting tackle. Report any defects immediately to your supervisor and remove from service
2. Know the weight being lifted, also the weight of your lifting tackle, as the two weights added together equals the total weight being applied to the crane. If in doubt ascertain from a supervisor.
3. No lifting tackle must be used unless the safe working load is indicated thereon.
4. All hooks must be either an approved ' C ' type hook or otherwise be fitted with a properly functional safety catch to prevent displacement of the lifting tackle.
5. Never shorten slings except by using the approved method. Chain slings should be shortened by means of a chain clutch.
6. Make sure the proper pin is used in all shackles, and that this pin is properly screwed home.
7. Do not carry any spare slings on the hook. Spare legs of brothers not in use must be hooked back on the main rings.
8. Protect wire ropes and slings with softwood or other suitable packing from the sharp edges of the load and avoid allowing the load to rest on a wire rope sling as it may crush the strands.
9. All end links, rings or shackles must ride freely upon any hook on which they are used.
10. Always see that the crane hook is centrally placed over the point of lift to prevent swinging. A swinging load is dangerous.
11. Take your hands away from the chains and ropes before the crane takes the load, and stand clear.
12. Proper signals according to the approved code must be given to the crane operator. The signals must be given by the person responsible for the lift (slinger), and nobody else.
13. Always face the crane operator when giving signals and stand in a secure position where you can see the load, and can be clearly seen by the crane operator. Do not stand under a suspended load.

14. Should it be necessary for you to leave the area of the crane operations while it is still working, you must be relieved by a deputy who is fully conversant with the duties involved and who has been trained in those duties.
15. A load must not be lifted with the point of the hook. The hooks should always point outwards when using multi-legged slings.
16. Do not leave loads suspended.
17. Never ride on a crane load, nor allow any other person to do so.
18. When not in use slings should be stored in a tidy manner and not left lying about on the site.
19. Wire ropes should never be sharply bent at any point.
20. Only eyebolts manufactured to approved standards should be used.
21. When slinging loads from stacked material ensure that there is safe egress for its subsequent removal.
22. Improvised slings must never be used to lift loads.
23. When a load is being lifted which approaches the safe working load of the crane, it should first be lifted just clear of the ground and held in this position so that the slings can be checked and the reaction of the crane to the load can also be observed.
24. Check all wire ropes at frequent intervals for kinks or frays and ensure they are free from projecting needles.
25. All lifting tackle must be inspected before and after usage.