

DIESEL MECHANIC



MINING QUALIFICATIONS AUTHORITY

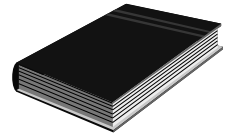
CODE: LM

LIFT AND MOVE A LOAD

INDEX

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SOURCE REFERENCES

Demonstration by a competent person, e.g. Training Officer.

Display board in the Training Centre.

OBJECTIVE

You will be learning towards the outcome “Lift and move a load”. Whilst learning towards the outcome you will be required to achieve the following:

- Lift and move loads of up to 5 tons safely and effectively.
- Check, erect and use ladders safely.

On completion of this module, the learner must be able to:

- Lift and move loads with chain blocks and an overhead beam.
- Move a load using crowbars and rollers.
- Use a thimble and rope clamps to make a "firm eye" at one end of a wire rope cable.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- Practical tests will be set during the module and must be completed without using references.
- The learner will be required to perform the following tasks:
 - ✓ The pre use checklist must be completed before using the ladder.
 - ✓ Move a 1½ ton load over a distance of 3 metres with two 1½ ton hand chain blocks and an overhead beam.
 - ✓ Move the load back to its original position on rollers.
 - ✓ Lift the load off the rollers and lower it to the ground, by means of using wedges and packing, or by using a hand chain block.
 - ✓ Use a thimble and rope clamps to make a "firm eye" at one end of 13mm and 20mm wire rope cables.

- The following standards must be achieved:
 - ✓ The safe working load (SWL) of the lifting equipment must not be exceeded.
 - ✓ Defective equipment must not be used.
 - ✓ Correct slinging methods must be used.
 - ✓ The slings must be protected on sharp corners.
 - ✓ The load must never rest on the sling.
 - ✓ There must be at least three rollers under the load when it is being moved with the crowbar.
 - ✓ The load, during lifting over the 3 metre distance, must not be raised more than 0.5m from the floor, neither must it touch the floor whilst being moved.
 - ✓ A shackle must be fitted to the eye bolt if one is being used.
 - ✓ The U-bolt of the wire rope clamps must be fitted over the dead end of the rope.
 - ✓ The required number of rope clamps must be used and they must be the correct distance $\pm 5\text{mm}$ apart.
- All safety procedures must be adhered to.

HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM**LM****LIFT AND MOVE A LOAD**

STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Use hand tools.	<ul style="list-style-type: none"> Using damaged tools or wrong tools for the job can cause injury and damage to equipment. 	<ul style="list-style-type: none"> Always use the correct tool for the job. Ensure tools are in good condition. Use tools correctly. Wear appropriate PPE where necessary. Always take good care of tools. Maintain, clean and store it properly.
2. Use lifting equipment.	<ul style="list-style-type: none"> Using defective lifting equipment can cause injury to persons and damage to equipment. Exceeding the Safe Working Load (SWL) of lifting equipment can result in equipment falling and injuring persons and damaging equipment. Failure to observe safe work practices can result in serious injury and damage to equipment. 	<ul style="list-style-type: none"> Examine all items of equipment carefully before use, as explained in the module. Establish the magnitude of the load to be lifted and select lifting equipment with an SWL equal to or more than the load. Never exceed the SWL. Always wear appropriate PPE when lifting and moving loads, e.g. hard hat, steel toed safety boots and heavy duty gloves. Observe all safety precautions and adhere to safe work practices relating to slinging and handling of heavy loads.

NOTE: Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner:

Signature of Training Officer:

Date:

1. LIFTING EQUIPMENT

ITEM / TASK: Introduction.

DESCRIPTION:

- A. When working in the plant or underground you will sometimes have to lift and move heavy machinery and equipment.
- B. If the mass of the equipment exceeds 5 tons, the lifting should be done by a qualified Rigger.
- C. Machines and equipment must be handled and lifted correctly in order to avoid damage and to prevent accidents.
- D. All lifting tackle described below must be examined before it is used and defective equipment, or equipment which does not have the required safe working load (SWL), must never be used.

ITEM / TASK: Hand chain block.

DESCRIPTION:

A. Construction and use:

- The hand chain block is normally portable. (Fig 1)

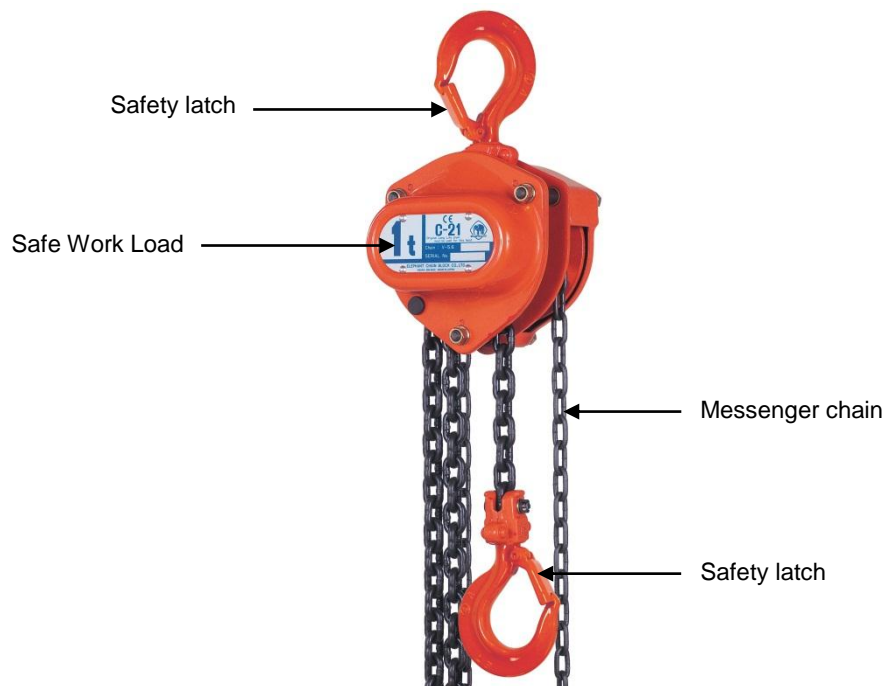


FIG 1.

- The light chain, also called the messenger chain, is used to operate the chain block. If it is pulled in one direction it will lift the load. If it is pulled in the other direction it will lower the load.
- The heavy chain is used to lift the load.
- The Safe Working Load (SWL) is normally indicated on the side of the block. (Fig 1)
- The hooks at both ends should be fitted with safety latches. (Fig 1)

B. Examining a chain block:

- Check that the chains are clean and free from any mud or grit.
- Ensure that the safety latches on both of the hooks are working properly.
- Examine every link on the heavy chain for cracks, corrosion and wear.
- Check that the SWL is indicated on the side and note what it is, e.g. 1 ton.
- Check the hooks to see that the set is still standard and has not been opened by overloading. If the distance between points A and C is 15% more than the distance between points A and B, the hook must be replaced. (Fig 2)

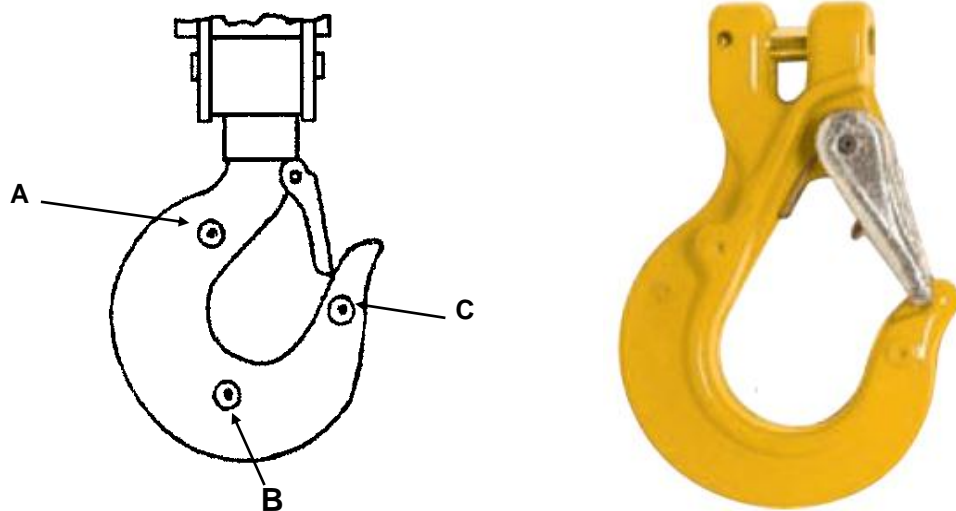


FIG 2.

- Check the body of the chain block, the split pins and the rotating wheel for wear and corrosion.
- Check the brake before lifting or lowering an object. This is done by pulling the chain when the brake is engaged. It should not move.

ITEM / TASK: Slings.

DESCRIPTION:

A. Construction and use:

- A common method of lifting loads is by using slings and is called slinging. A sling is usually made of wire rope. (Fig 3)



Wire rope sling

FIG 3.

- Approved wire rope slings are issued with test certificates. The SWL is sometimes stamped or tagged on the sling, e.g. SWL = 4 ton.

B. Examining a sling:

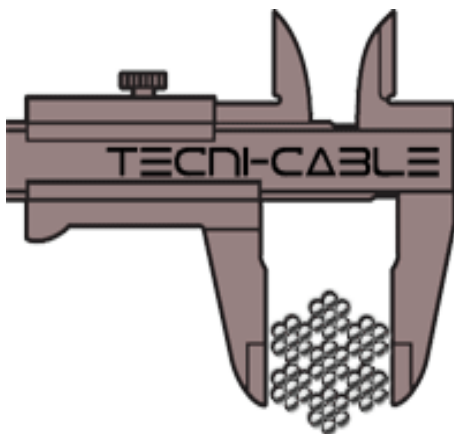
- There must not be more than six broken wires.
- The sling must not be worn down by more than 10% of its nominal diameter.

Example:

If the nominal diameter of a rope is 20mm, then it may not be less than 18mm thick. (90% of 20mm)

The rope must be measured with a vernier calliper over opposite strands to determine the correct diameter (Fig. 4), i.e. three separate readings for a six-strand rope. The readings are then averaged to obtain the diameter.

INCORRECT



CORRECT

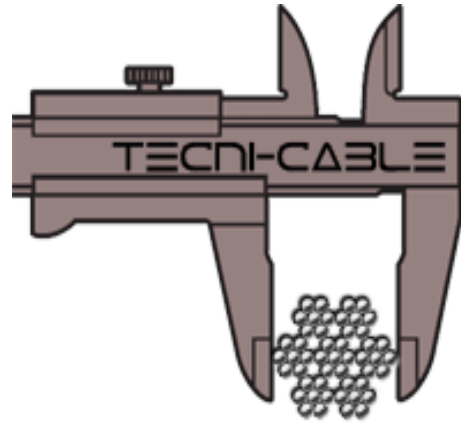


FIG 4.

- The rope must not be corroded. If there is any pitting on the wires of the sling, it must be discarded.
- Do not use a sling, which contains a severe kink. (Fig 5)



FIG 5.



NB:

A sling which shows any of the above defects must be cut up with a torch and thrown away. If it is used, accidents may occur.

ITEM / TASK: Shackles.

DESCRIPTION:

A. Construction and use:

- A shackle is used to join slings together and should, whenever possible, when applied for lifting, be used in conjunction with an eye-bolt. (Fig 6)
- The safe working load of a shackle is normally stamped on its side (Fig. 6).

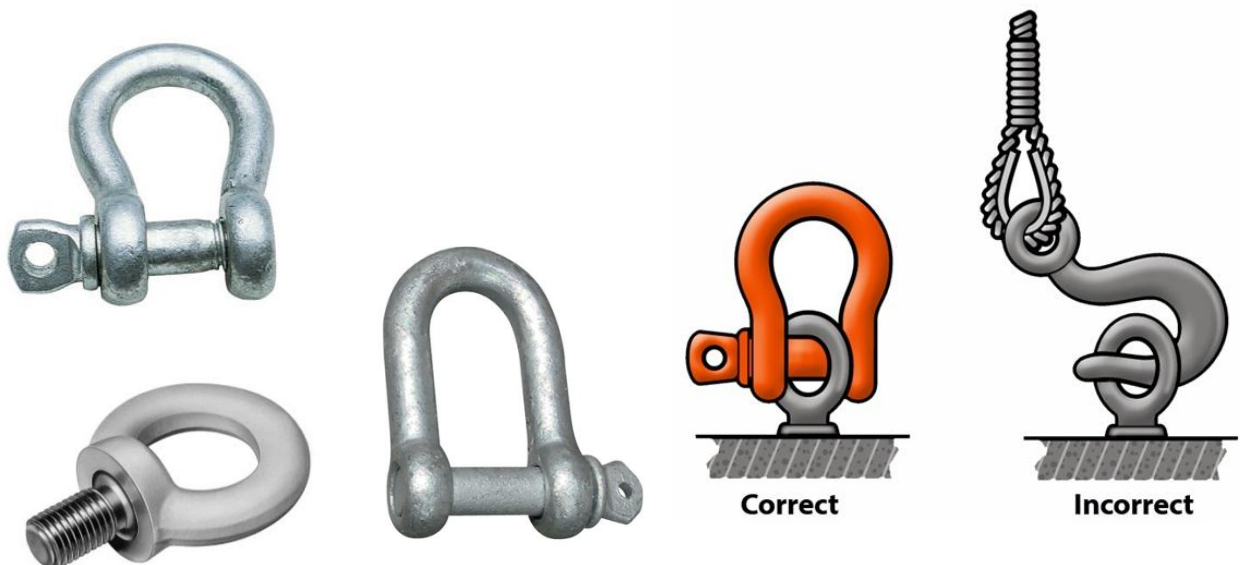


FIG 6.

B. Examining a shackle:

- The threads on the pin and in the bow must not be damaged.
- There must not be any cracks in the bow.

ITEM / TASK: Eye bolts.

DESCRIPTION:

A. Construction and use:

- Special facilities for lifting, e.g. drilled and tapped holes for eye bolts (Fig 7) or drilled holes / lugs (Fig 8) for shackles or bars, are provided on some equipment.

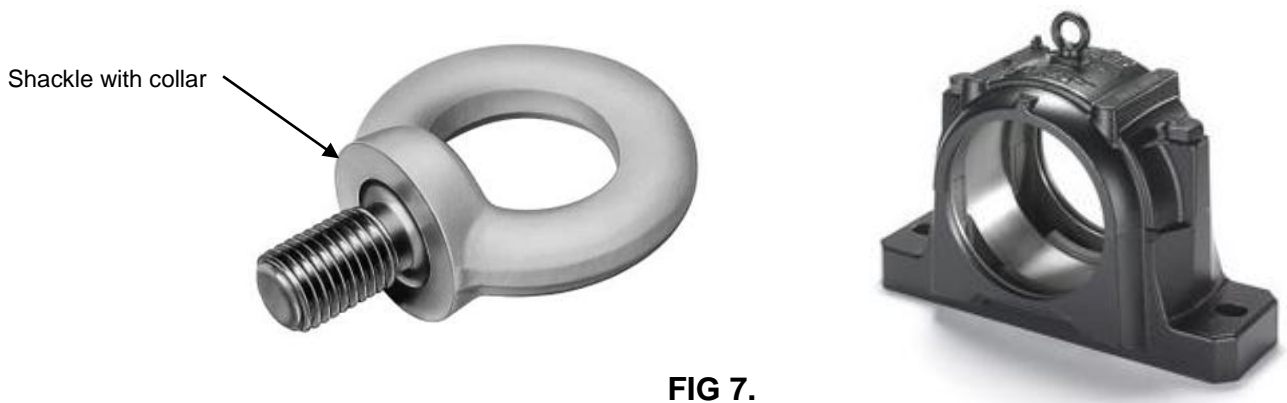


FIG 7.



FIG 8.

- If provided with collars it will add substantial strength to the eye bolt. (Refer back to Fig 7 above)
- Eye bolts without a collar are unsuitable for inclined loading and should not be used.

B. Examining an eye bolt:

- Make sure that the thread on the eye bolt is not damaged.
- Make sure that the underside of the collar and the contact surface is smooth and flat, and that the closest possible contact is obtained between them.
- Make sure that there are not any cracks in the eye bolt.

ITEM / TASK: Crowbars.

DESCRIPTION:

A. Construction and use:

- Crowbars give leverage and enable heavy loads to be lifted or moved.
- Crowbars are made in a variety of lengths. A short crowbar is easier to handle and fits into a narrow gap. Long crowbars give a greater leverage.
- Crowbars may be either single or double ended. A single ended crowbar is safer to use because the handle has a rounded end. A double-ended crowbar normally has a curved end, which is used for lifting, and a straight end, which is used for pushing.

(Fig

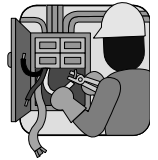


FIG 9.

B. Examining a crowbar:

- Check the crowbar for any cracks.
- Check to see if the shaft is badly bent.
- Remove all the burrs and sharp edges with a file or grinder.

**DO THE PRACTICE ON THE NEXT PAGE
BEFORE CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

- Go to the rack which has various items of equipment for lifting and examine them for any defects.
- Point out any defects to your training officer.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

2. SLINGING

ITEM / TASK: Introduction.

DESCRIPTION:

- A. Slings are used to lift equipment.
- B. When steel wire rope slings are used to lift loads, which have sharp corners and edges, corner protection must be inserted between the sharp edge and the steel rope sling.
(Fig 10)

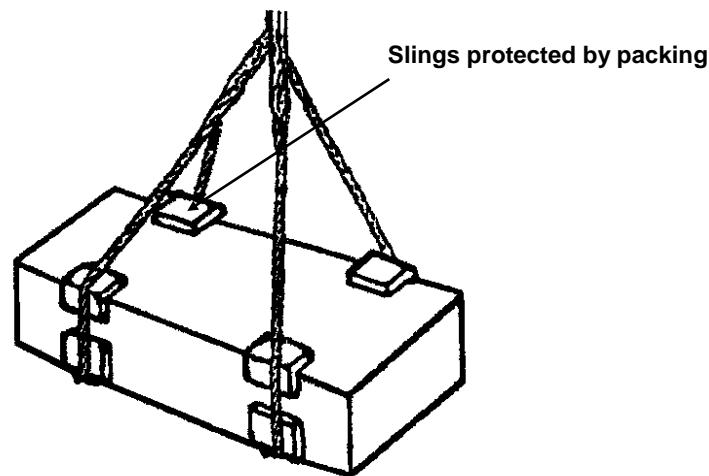


FIG 10.

ITEM / TASK: Safe working load (SWL) for wire ropes.

DESCRIPTION:

- A. The following two factors must be considered when lifting an object:
 - The mass to be lifted. If the mass is not known it must be estimated.
 - The angle which will be formed between the two legs of the sling.
- B. When the rope is made into a sling and positioned on a load, the angle formed by the two legs of the rope must not exceed 90° if excessive stress in the ropes is to be avoided.

Table 1 on the next page shows the effect of an increasing angle between the legs of a rope sling on the safe working load (SWL) of the sling.

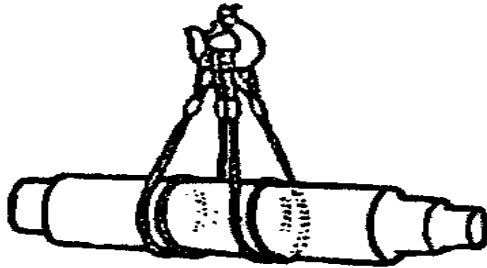
<u>TABLE 1</u> <u>SAFE WORKING LOAD FOR WIRE ROPE AT ANGLES INDICATED (TONS)</u>				
DIAMETER	30°	60°	90°	120°
13 mm	3.28	2.94	2.40	1.70
14 mm	3.91	3.50	2.86	2.02
16 mm	5.09	4.56	3.73	2.63
18 mm	6.33	5.68	4.64	3.28
20 mm	7.84	7.04	5.74	4.06
22 mm	9.58	8.60	7.02	4.96
24 mm	11.49	10.30	8.42	5.95
26 mm	13.55	12.16	9.93	7.02
28 mm	15.72	14.10	11.51	8.14
32 mm	20.74	18.60	15.19	10.72



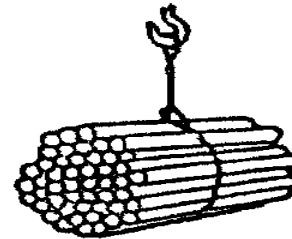
ITEM / TASK: Correct method of slinging.

DESCRIPTION:

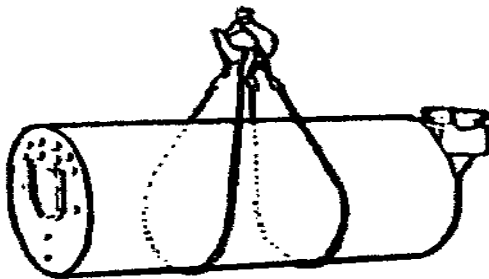
Fig 11 shows how different items should be slung.



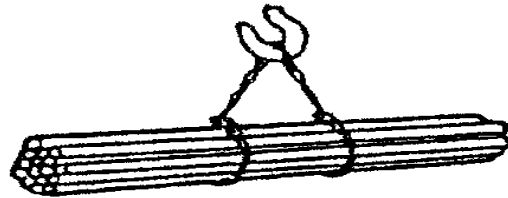
Double wrap slinging



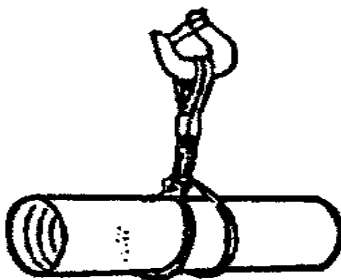
Reeve sling



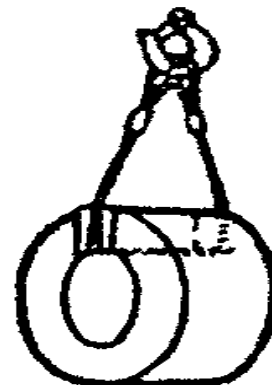
Cradle slinging



Double reeve sling



Halsh slinging



Internal cradle slinging

FIG 11.



ITEM / TASK: Precautions to be taken when slinging.

DESCRIPTION:

- Do not load a shackle at an angle greater than 90°. (Fig 12)

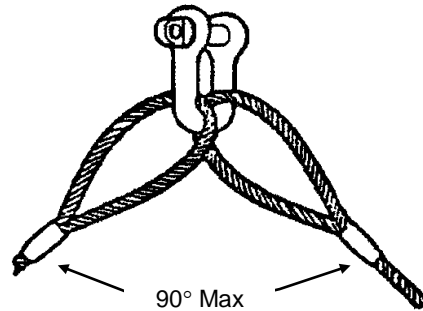
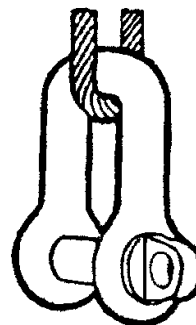


FIG 12.

- When using a sling and a shackle as indicated in Fig 13, it must be remembered that the rope has a safe working load (SWL) which is only equivalent to that of a single part of the rope.



SWL is equal to that of
a single rope

FIG 13.

- Never used an eye bolt without a collar or in the way shown in Fig 14.



FIG 14.

- The crane hook should not be loaded at an angle greater than 90° as this could strain the hook. It is also possible that one of the slings will jump off the hook if this angle is exceeded. (Fig 15)

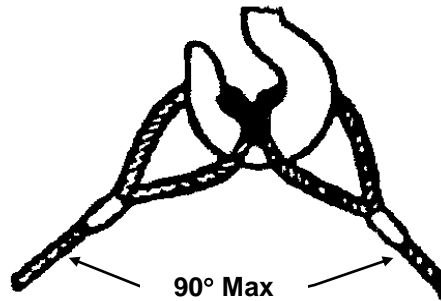


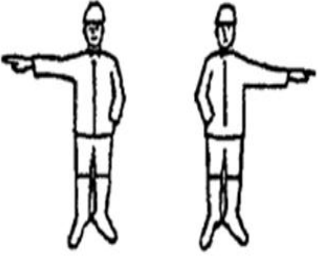
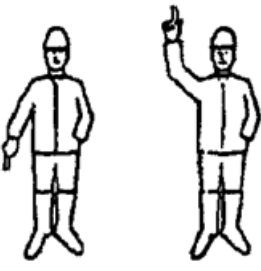
FIG 15.

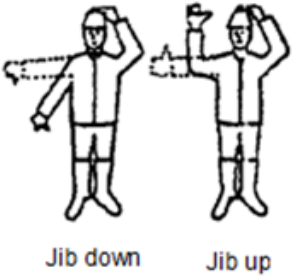




ITEM / TASK: Signals for moving loads with overhead cranes.

DESCRIPTION:

Overhead cranes are installed in all well-equipped workshops.

There is a standard method of signalling to the crane driver and the various signals are shown below.

<u>SIGNAL</u>	<u>DESCRIPTION</u>
	Move in the direction indicated.
 <p>Lower Lift</p>	Clench and unclench fingers to signal : "Take the strain"

 <p>Jib down Jib up</p>	<p>Clench and unclench fingers to signal : “Inch the load”</p>
	<p>Move towards the driver.</p>
	<p>Move away from the driver.</p>
	<p>Stop.</p>
	<p>Emergency stop.</p>



3. LADDERS

ITEM / TASK: Types of ladders.

DESCRIPTION:

A. Ladders are generally made of aluminium alloy, wood or steel and can be classified into four types.

B. Types of ladders.

- Step ladders. (Aluminium alloy or wood) (Fig 16)
- Straight portable ladders. (Aluminium alloy or wood) (Fig 17)
- Extending ladders. (Aluminium alloy or wood) (Fig 18)
- Fixed ladders. (Steel) (Fig 19)



FIG 16.



FIG 17.



FIG 18.



FIG 19.

C. You will note that the fixed ladder incorporates a cage.

The Machinery and Occupational Health and Safety Act requires that a fixed ladder with a vertical height that exceeds 5 metres, shall be provided with a cage starting at a point not more than 2.5 metres from the lower level to a height of at least 1 metre above the stepping off point.

It further demands that the cage shall provide firm support for the back of a person and that no part of the cage shall be further than 0.7 metres away from the plane of the rungs and that the rungs shall be at least 150mm away from the structure to which the ladder is secured.

D. Rules

The following is a shortened version of the rules applicable to ladders as laid down by the Machinery and Occupational Health and Safety Act.

No person shall be required or permitted to use a ladder unless the following provisions are complied with.

a. **Every ladder shall be:**

- i. Of good construction, with sound material and adequate strength and suited to the purpose for which it is intended.
- ii. Fitted with non-skid devices at the bottom of the stiles or with hooks at the top of the stiles.
- iii. Lashed or secured to ensure stability under all conditions at all times while being used.

b. **No ladder shall be used which:**

- i. Has its rungs fastened to the stiles by means of nails, screws, dowels or the like only, and except for metal ladders with a welded construction, the rungs shall always be let into the stiles.
- ii. Has defective stiles or defective or missing rungs.

c. **No straight portable ladder:**

- i. That is 9 metres or longer shall be leaned against a structure or wall as its only means of support unless it is an extension ladder.
- ii. Shall have its reach extended by the tying together of two or more ladders.

d. **Wooden ladders shall:**

- i. Be constructed of straight grained timber free from defects and with the grain running the length of the stiles and rungs.
- ii. Not be painted or covered in any other way, unless it has been established by the user that there are no cracks or other defects or weaknesses. Figure 20 shows a typical defective ladder.

NB: Ladders can be oiled or painted with clear varnish or wood preservative.



FIG 20.

e. When work is carried out from a ladder:

- i. Hand tools shall always be kept in suitable sheaths or holders provided for that purpose except when in actual use.
- ii. Additional tools and equipment must be hauled up on a suitable length of heavy string or light rope.

**DO THE SELF TEST ON THE NEXT PAGE
BEFORE CONTINUING WITH THE REST OF THE MODULE.**



SELF TEST 1

1. Why must ladders not be painted?

2. What should be fitted to the stiles at the bottom of the ladder?

3. What is the maximum length permitted for a ladder that will rely solely on the wall it leans against for support?

4. How must hand tools be carried whilst working on a ladder?

Refer to your notes to check your answers.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

ITEM / TASK: Inspection of ladders.**DESCRIPTION:**

- A. A competent person must inspect ladders for visible defects periodically and after any incident that could affect their safe use.
- B. Records to be kept of each inspection.

<u>LADDER CHECKLIST</u>		
DATE OF INSPECTION	:	_____
TYPE OF LADDER	:	_____
NUMBER	:	_____
LOCATION	:	_____
<u>DESCRIPTION</u>	<u>YES</u>	<u>NO</u>
1. Loose steps or rungs.		
2. Loose nails, screws or bolts.		
3. Cracked or broken stiles		
4. Cracked or broken steps or rungs		
5. Loose or bent hinge spreaders		
6. Slivers on stiles		
7. Slivers on rungs or steps		
8. Damaged or worn non-skid bases		
9. Damaged hooks		
10. Hooks missing		
11. Extension locks broken		
12. Extension locks missing		
13. Extension locks loose		
14. Fixed ladder cage in order		
15. Ladder clean		
16. The ladder is serviceable		
Inspection done by :		Signature:

ITEM / TASK: Lifting and carrying ladders.

DESCRIPTION:

A. Short ladders.

- Bend the knees and grip one stile near the middle firmly. Keep the back straight and straighten up. (Fig 21)

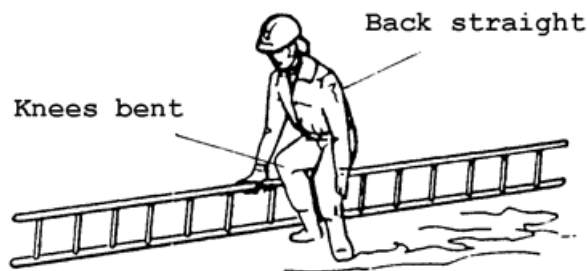


FIG 21.

- Lift the ladder onto the shoulder and grip the upper stile firmly to prevent the ladder from swinging and hitting other people. (Fig 22)

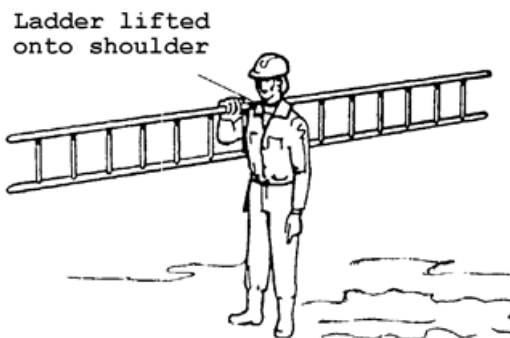


FIG 22.

B. Long ladders.

- Stand at the narrow end of the ladder with the feet slightly apart.
- Bend down at the knees with the back straight and grasp the top wrung of the ladder. (Fig 23)

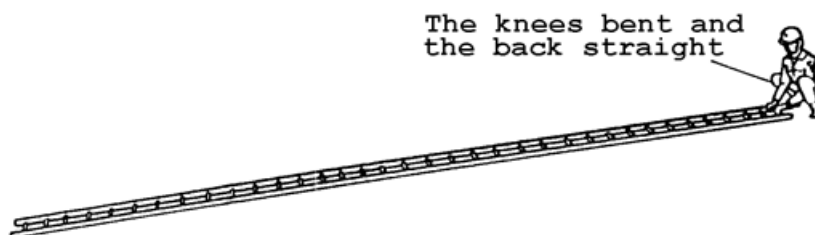


FIG 23.

- Straighten up keeping the arms downwards and close to the body.
- Raise the ladder above the head and walk forward hand over hand from one rung to the next. (Fig 24)

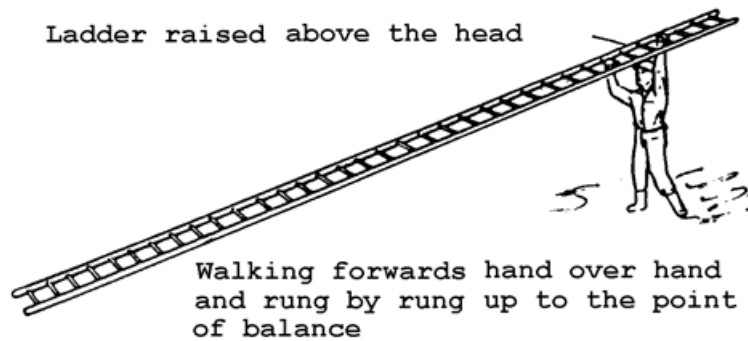


FIG 24.

- Grip the upper stile firmly to prevent the ladder from swinging and hitting other people.
- Keep the front higher than the back so as to ensure an unobstructed vision ahead and to avoid hitting other people. (Fig 25)

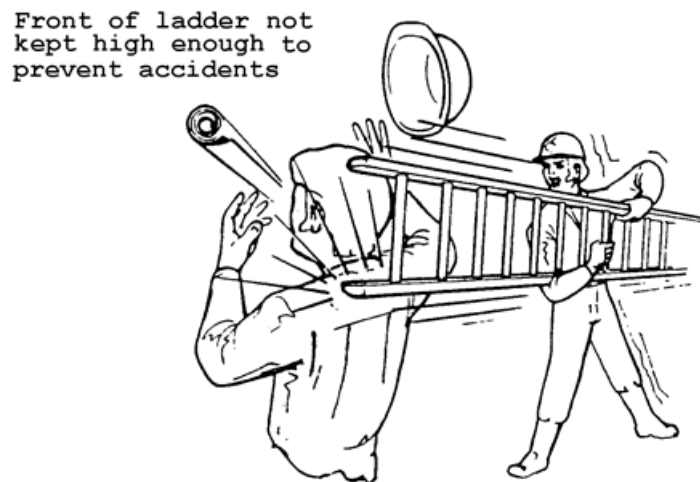


FIG 25.

ITEM / TASK: Erecting a ladder.

DESCRIPTION:

A. Against a wall.

- Stand the ladder on a firm and level surface with the bottom one quarter of its own height away from the structure. (Fig 26)

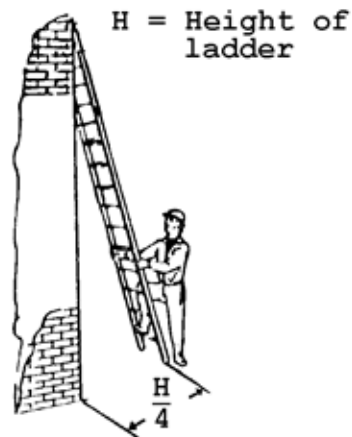


FIG 26.

- Do the following if it is a long ladder:
 - ✓ Place the foot of the ladder against the wall and lift the ladder by walking forward hand over hand from rung to rung. (Fig 27)

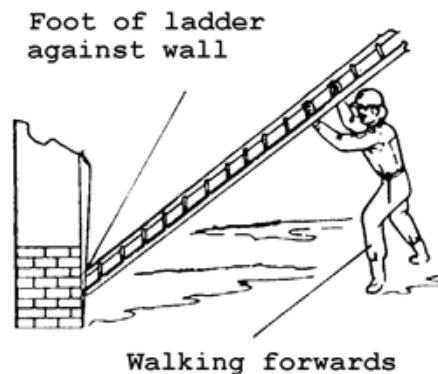


FIG 27.

- ✓ Steady the ladder when it is upright and then move it away from the wall at the bottom to be a quarter of its length away.
- ✓ Lash the ladder to the structure where possible to prevent the bottom from slipping.
- ✓ Ask the assistant to steady the base where it is not possible to lash the ladder or toe the stiles to the ground if the surface is soft enough.

B. Against a roof or scaffold.

- Ask an assistant to place one foot on the bottom rung of the ladder to steady the base and prevent movement. (Fig 28)

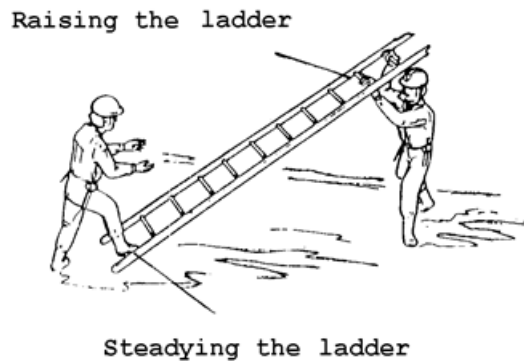


FIG 28.

- Walk forward hand over hand rung by rung until the assistant can get hold of the stiles to help steady the ladder in the vertical position. (Fig 29)
- Lift the bottom of the ladder away a quarter of its length from the structure.
- Ask the assistant to steady the ladder, then mount the ladder one rung at a time by grasping on the stiles. (Fig 30)

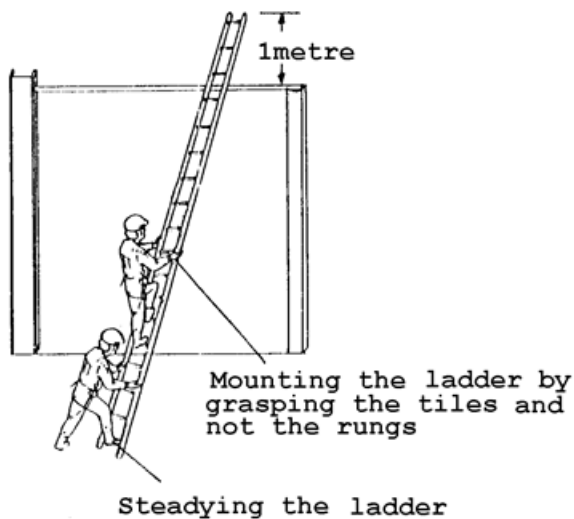


FIG 29.

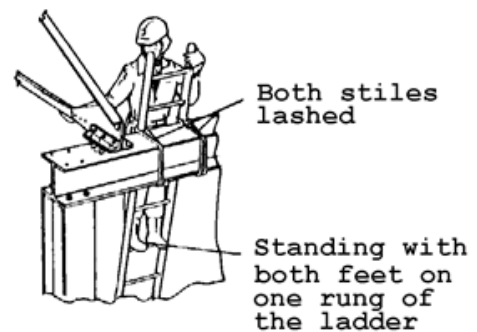


FIG 30.

- Never mount a ladder by grasping the rungs.
- Stand with both feet on one rung and lash both stiles. (Fig 30)
- The ladder must be long enough so that about 1 metre protrudes above the stepping off point.

- Lash the top and bottom of the ladder if it is to stand vertically against a structure. (Fig 31)

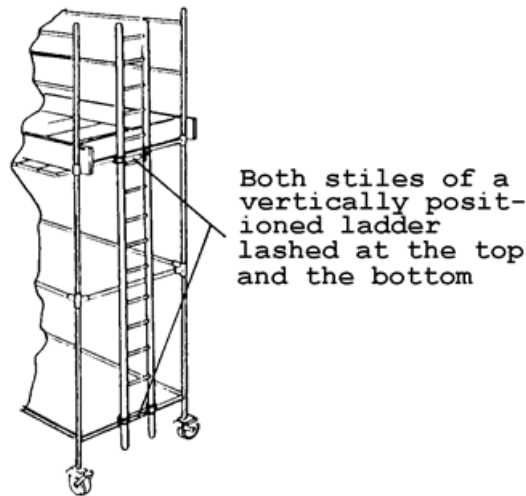


FIG 31.



NB:

Safety Harness must be worn if work is carried out, at a height exceeding 2m.

- Attach the safety harness to a convenient part of the structure before attempting any further work on the construction. (Fig 32)

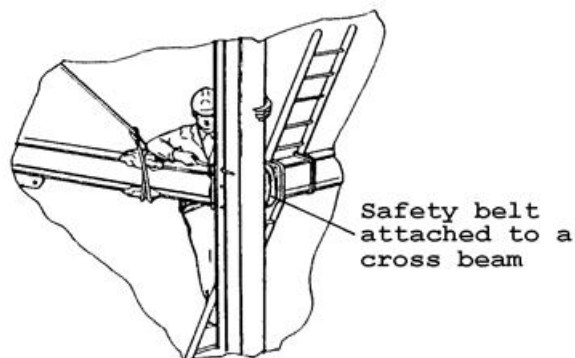


FIG 32.

- In the event of an extending ladder being used, the upper and bottom sections of the ladder must overlap by at least 4 rungs. (Fig 33) Less than that would cause unnecessary strain and possible collapse and accidents.

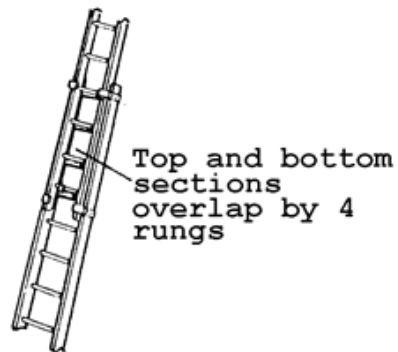
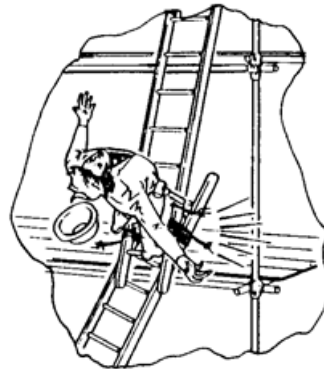


FIG 33.

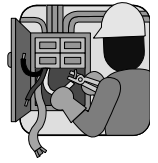
- Make sure the ladder is long enough for the job intended and never attempt to lash ladders together as the body mass is too great for safety. (Fig 34)



Ladders lashed together are unsafe and could cause accidents

FIG 34.

**DO THE PRACTICE ON THE NEXT PAGE
BEFORE CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

Practice lifting, carrying, erecting and using all the different ladders described in this module.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

4. MOVE A HEAVY LOAD



ITEM / TASK: Move a heavy load with two chain blocks.

DESCRIPTION:

- A. Determine the mass of the load by consulting the manufacturer's manual, the delivery note etc., or by estimation.
- B. Select three slings, each of which has a SWL capable of supporting both the load and the lifting equipment and long enough to wrap around an overhead beam at least three times.
- C. Place the slings over the beam and check that it is secure. Place some soft material over the beam to protect the sling. The slings must be 1 - 1½ metre apart. (Fig 35)

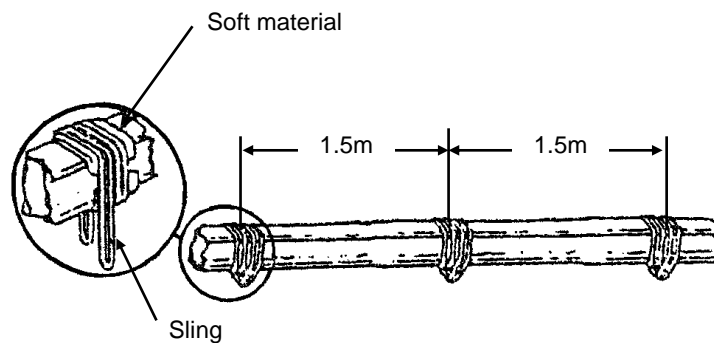


FIG 35.

- D. Select two chain blocks each having a SWL capable of supporting the load.
- E. Haul the lifting equipment up to the beam with a fibre rope and hook the chain blocks onto the shackles. (Fig 36)

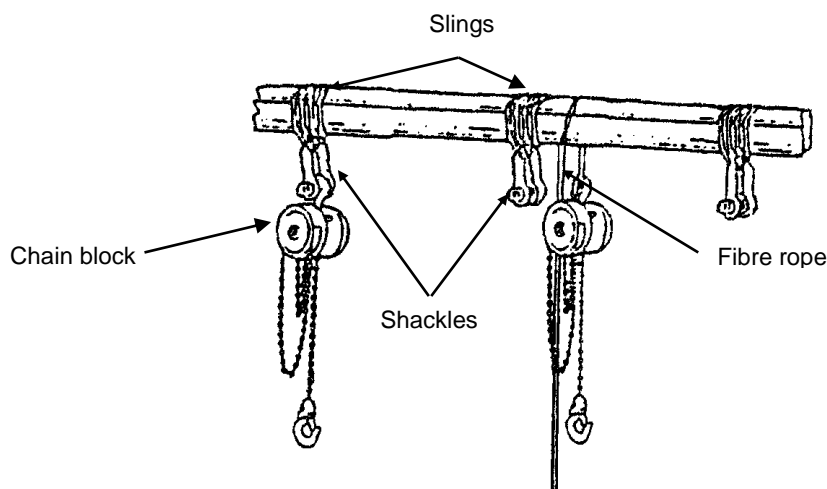


FIG 36.

F. Select two slings suitable for slinging the load by the cradle method. (Fig 37)

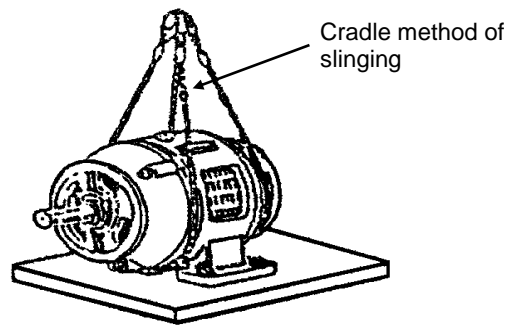


FIG 37.

G. Fit two shackles through the four eyes of the two slings.

H. Keep the messenger chain clear of the load and in line with the messenger wheel, and check the direction in which the chain must be pulled to raise or lower the load. (Fig 38)

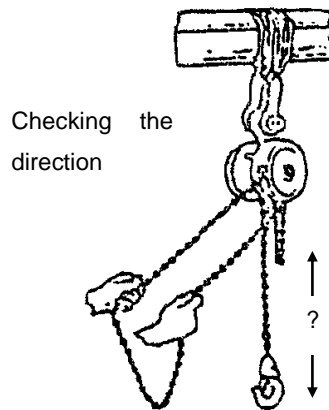


FIG 38.

I. Lift the load with No. 1 chain block and only take up the tension with No. 2 chain block. (Fig 39)

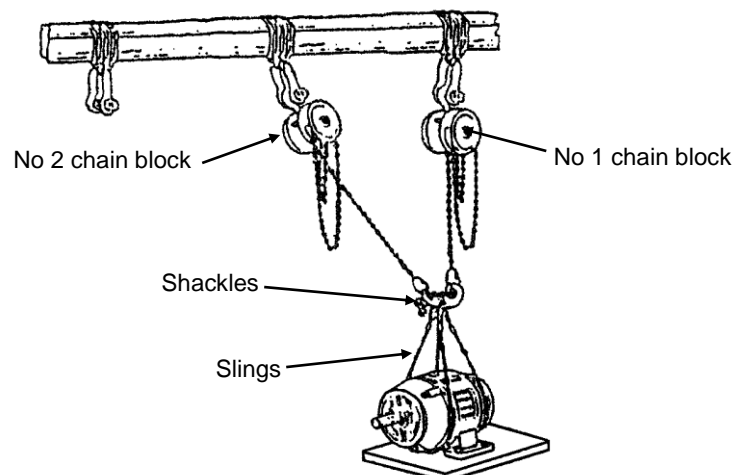


FIG 39.

- J. Slacken No. 1 chain block and take the load with No. 2 chain block.
- K. Continue doing this until the load hangs directly under No. 2 chain block.

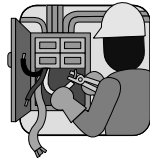
NB:



- a. **The load must not touch the floor and it must not be lifted higher than 0.5m above the floor.**
- b. **The angle formed by the chains of the two blocks must not exceed 90° at any time.**
- c. **Stand clear while you are lifting the load.**

- L. Now unhook No. 1 chain block and hook it onto the third sling.
- M. Follow the same procedure until the load hangs directly under the third sling.
- N. Lower the load to the floor onto a block of timber to avoid crushing the slings between the load and the floor.

**DO THE PRACTICE ON THE NEXT PAGE
BEFORE CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

Go to the overhead beam and follow the method described to move the load from one side to the other.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



ITEM / TASK: Move a heavy load using rollers.

DESCRIPTION:

If an overhead beam or a crane is not available to move a load over a certain distance, the load may be lifted using wedges and packing, or a jack. Rollers may be placed under the load to move it.

Use the following method:

- Select rollers that are:
 - ✓ large enough to roll over any unevenness along the route, but small enough so that they can be lifted easily.
 - ✓ long enough to project on both sides of the load, so that they can be positioned easily.

(Fig 40)

At least three rollers of the same diameter are required.

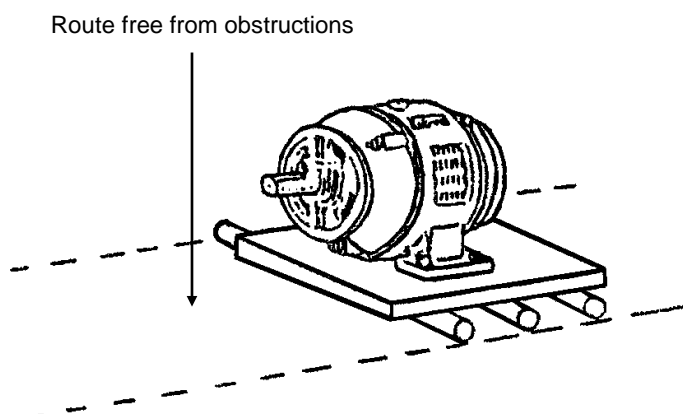


FIG 40.

- Check the route before moving a load to see that:
 - ✓ it is wide enough,
 - ✓ there are no obstructions,
 - ✓ it is flat enough, and
 - ✓ it is firm enough.
- If an overhead beam is available, one can lift the load with a chain block. Another alternative is to make use of the wedge and packing, or jacking method. Use an eye bolt and a shackle.
- Place the rollers under the load.
- Lower the load evenly onto the rollers.

- Push the load forward slowly with a crowbar.
- Whenever a roller is freed behind the load it must be picked up and placed in front of the load again. (Fig 41)

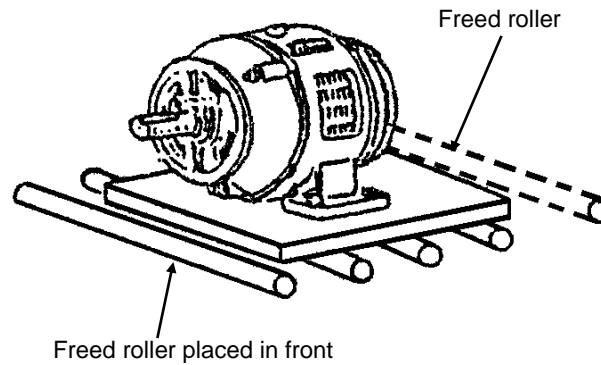
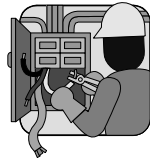


FIG 41.

- Lift the load with the chain block.
- Remove the rollers.
- Lower the load onto the floor again.

**DO THE PRACTICE ON THE NEXT PAGE
BEFORE CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

Move a given load on rollers over a distance of 3m.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

5. USE WIRE ROPE CLAMPS

ITEM / TASK: Wire rope clamps.

DESCRIPTION:

- A. Wire rope clamps (Fig 42), when applied properly, are a simple and effective means of making a temporary sling. They are also useful for joining two ropes to form a single temporary rope.
- B. The size of a rope clamp is the distance measured between the two legs of the U-bolt of the clamp, and must be the same as the diameter of the rope, which has to be clamped. (Fig 23)

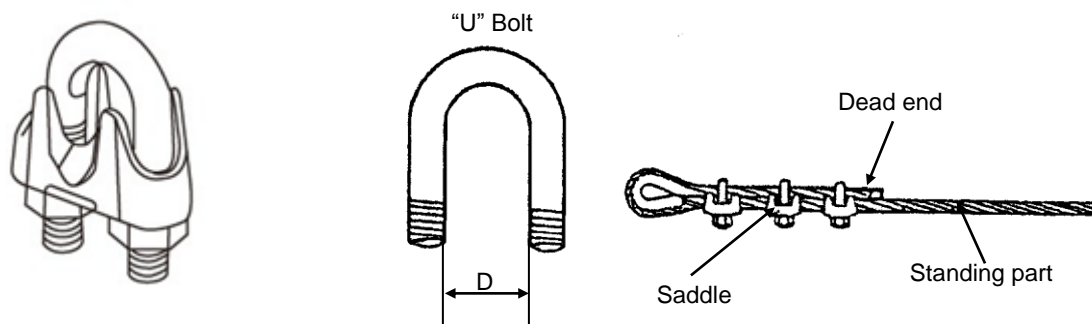


FIG 42.

- C. The number of clamps, which must be fitted, varies with the size of the rope. (Table 2)
- D. The rope clamps should be spaced at distances approximately 6 times the rope diameter.

TABLE 2 WIRE ROPE JOINTS		
D	a	b
6	20	3
8	20	3
10	20	3
12	35	3
16	85	3
20	85	3
22	85	4
26	170	4

NOTE :

D = Clamp and rope size (mm)

a = Torque in Nm

b = Number of clamps



ITEM / TASK: Make up a firm eye with rope clamps and a thimble.

DESCRIPTION:

A. Turn the rope back over the thimble. (Fig 43) The distance (X) from the thimble to the point of the dead end of the rope must be -

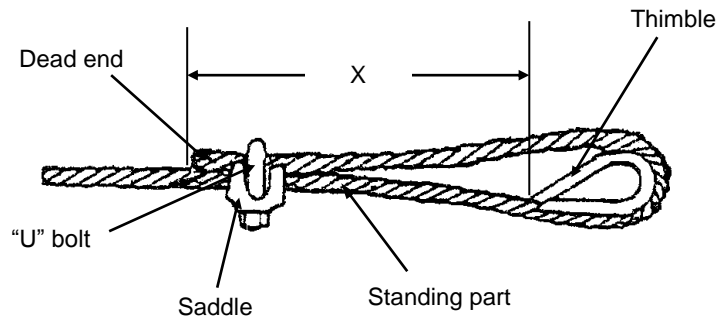


FIG 43.

The distance (X) from the thimble to the point of the dead end of the rope must be -

$$X = 6 \times \text{rope diameter} \times \text{number of clamps to be fitted in the joint.}$$

e.g.	Rope diameter	=	13mm
	Number of clamps (Table 2)	=	3

Therefore:

$$\begin{aligned} X &= 6 \times 13 \times 3 \\ &= 234\text{mm} \end{aligned}$$

B. Apply the first clamp one space (6 x diameter of the rope) from the dead end of the rope - 78mm in the above example.



NB:

The U-bolt must be fitted over the dead end. Never fit the U-bolt over the live end because then the joint will slip and the U-bolt will tend to pinch the rope. Refer back to Fig 43.

C. Apply the next clamp as near to the loop as possible. Screw on the nuts firmly but do not tighten them. (Fig 44 on the following page)

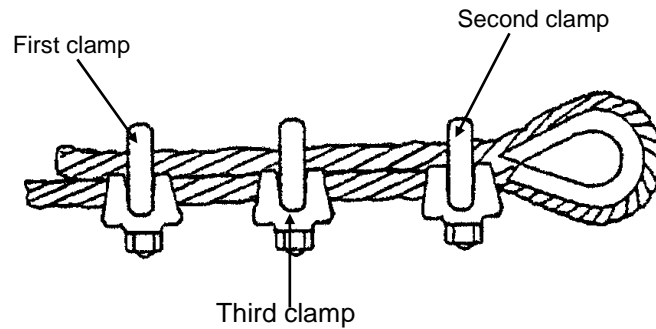


FIG 44.

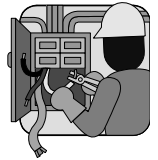
- D. Space the additional clamp equally between the first two as shown in Fig 44. Tighten all the nuts to the required torque. (See Table 2)



NB:

After the initial load has been applied, all the nuts must be re-tightened.

**DO THE PRACTICE ON THE NEXT PAGE BEFORE
ATTEMPTING THE ASSESSMENT FOR THE MODULE.**



PRACTICE

Practice making firm eyes in various size ropes.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



REMEMBER ALWAYS WORK SAFE

Once you have passed the entire practices, you are now at liberty to request a Formative Assessment from your Assessor.