Crane Safety

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May 2010

McCONNELL DOWELL
CREATIVE CONSTRUCTION™

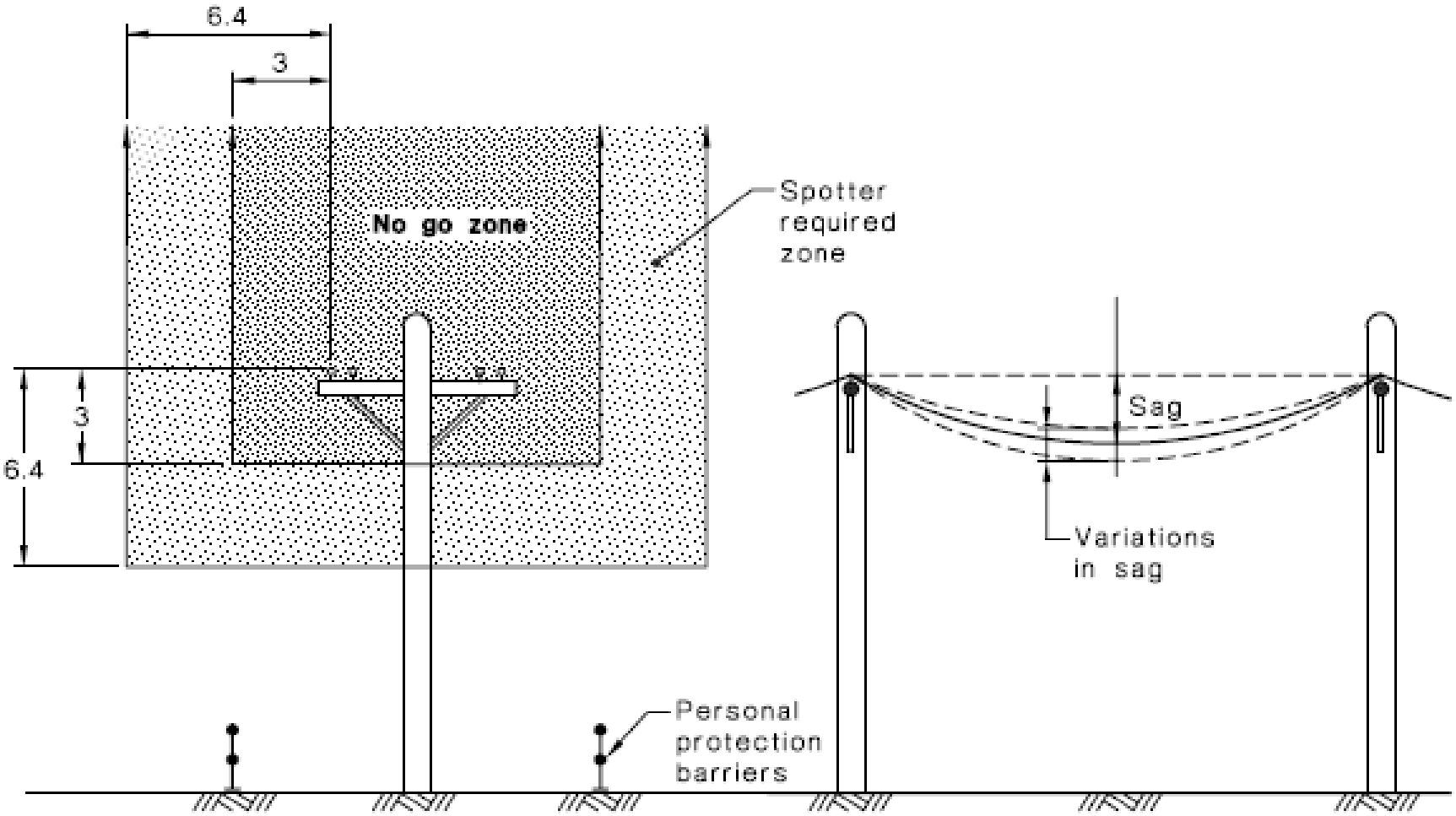
Learning's

- Site Setup
- Chain & Sling condition and checking
- Lifting and Slinging
- Crane movement
- Accidents
- Signalling
- MCD Requirements

Site Setup

- Crane Operators and Signalman should thoroughly inspect the working site prior to setting up.
  - Things to look for:
    - Overhead power lines
    - Even stable ground
    - Vehicle movements
    - No excavations close by
    - Outriggers on even packing / plates
  - Loads should not be lifted over:
    - Pedestrians and mobile equipment;
    - Office buildings, or structures where persons are likely to be present;
    - Dangerous materials such as chemical storage areas; or
    - Obstructions where the load could become caught.
    - Powerlines

Power Lines


6.4
3
No go zone
Spotter required zone
3
6.4
Sag
Variations in sag
Personal protection barriers
FRONT VIEW
SIDE VIEW

Look at Ground Conditions

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Outriggers need to be on even packing

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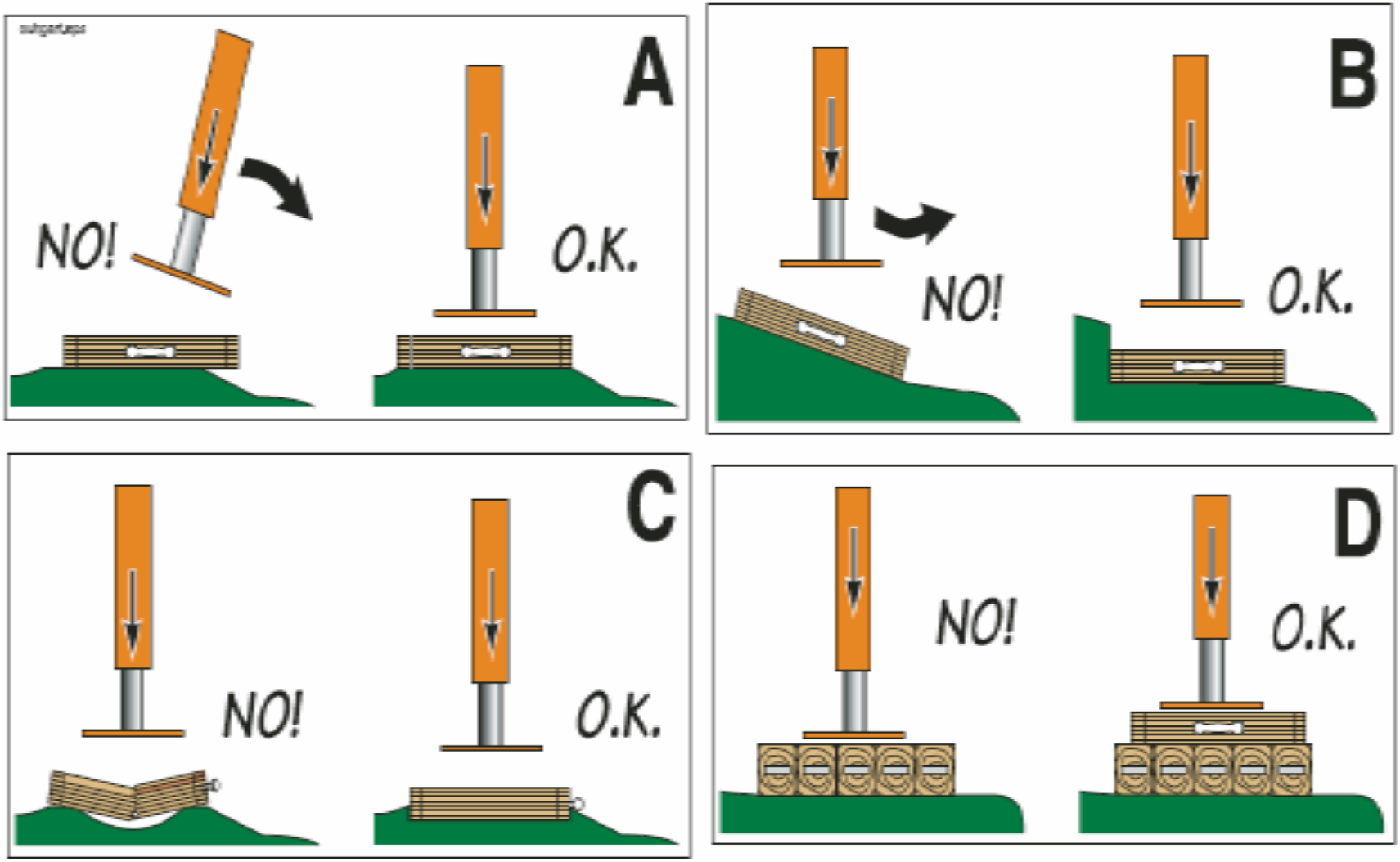

Poor Ground Conditions

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Chain and Wire Rope Condition

- Before use chains they must be checked for the following:

- Safe Working Load (SWL)
- Tagged with test date
- Chains:
  - Stretched or cracked links, unauthorised welding
- Shackles:
  - Worn / damaged, must be marked with SWL and test date, bent pin or distorted bow

Steel Wire Rope

- Steel Wire Rope is constructed of wires and strands laid around a central core. In the illustration below there are 19 wires to the strand and 6 strands around the core making up the rope.

Steel Wire Rope

INSPECTION

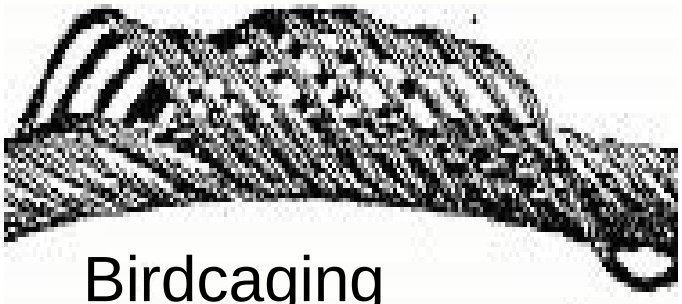
- It is important to check all wire ropes for wear and damage before use. Wire rope can deteriorate due to several factors:
  - Abrasion
  - Fatigue
  - Corrosion
  - Stretching (from overloading and shock loading)
  - mechanical damage.
- When inspecting:
  - Observe the construction and lay of the rope. Check for signs of stretching
  - Check the whole rope for broken wires - The total number of broken wires must not exceed 10% of the total wires.
  - Bird-caging, kinking, core collapse, corrosion or excessive number of broken wires

Steel Wire Rope

Discard SWR rope if there is:

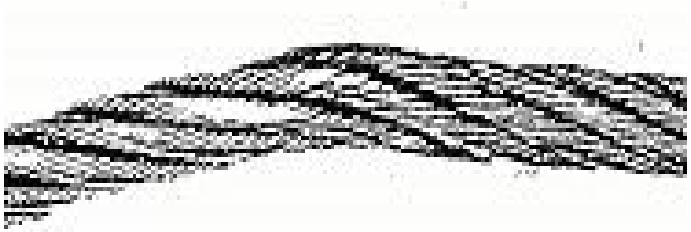
- A single broken wire below a metal socket, end fitting or a machine splice.
- Abrasion and core collapse.
- Corrosion. Red oxide powder and loose and springy wires can indicate serious corrosion.
- Kinks, knots or fractures from bending or kinking.
- Crushed or jammed strands.
- Bird-caging. It can be caused by rotation of the end of a rope or a shock from a sudden release from loading.

Steel Wire Rope

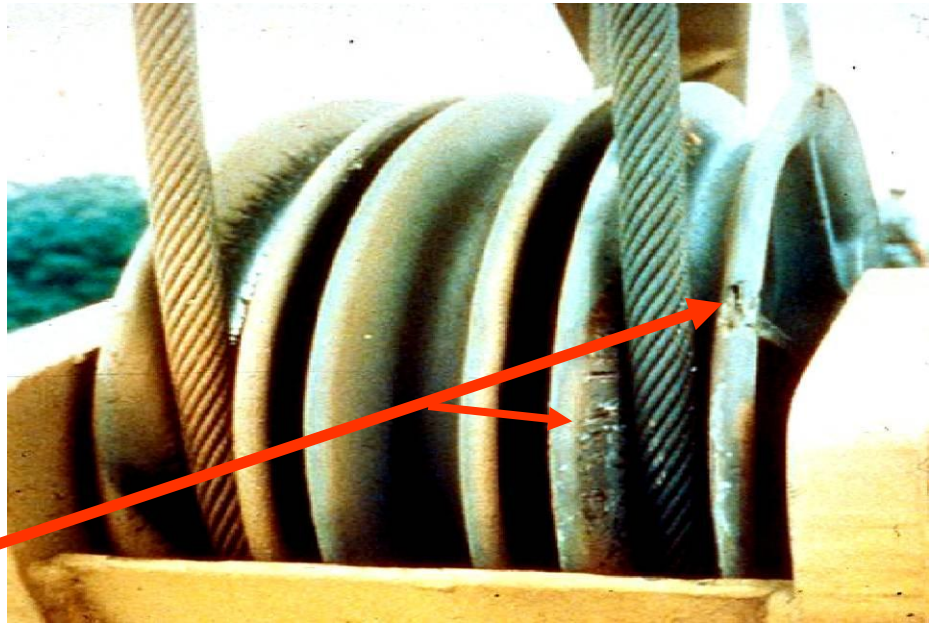


Birdcaging

Mechanical wear



Kinking



Sheave wear- This can damage wire rope.

Chains

SAFE USE AND MAINTENANCE

- A chain sling is only as strong as its weakest link
- When using chains or slings, always check the SWL and that they are in a good condition.
- Do not lift a load heavier than the SWL of the chain.
- Do not use a chain in which the links are stretched, frozen or do not move freely.
- Do not twist, kink or knot chain.
- Do not drop a chain from a height.
- Do not roll loads over a chain.
- Do not use a chain with a link that is cracked, or that has been spot welded other than by the manufacturer.
- Use protective padding when using chain around sharp corners.
- Do not tow anything with lifting equipment

Chains

Chains

INSPECTION

- Inspect your chains and slings regularly.
- Ensure the monthly colour coding is correct.
- Links that are frozen together show that the chain has been stretched.
- Inspect connection points, pins, latches and hooks for signs for any signs of distortion.
- If any damage or wear the chain must be tagged and taken out of service.

Shackles

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Bow Shackle

Shackles

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D Shackle

Hook and Latch

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Hook and Latch

Shackles

- Do not use a shackle that does not have the SWL marked.
- Do not use a bolt and nut in place of the proper shackle pin.
- Do not use a shackle that is bent, deformed or damaged.
- Secure the shackle. Prevent jamming by tightening the shackle pin finger tight and then release it by a quarter turn.
- Do not throw shackles on the ground as this causes damage and the dirt seizes the thread

Synthetic Slings

Safe work load is clearly marked.

Synthetic Slings

LOOK FOR:

- Any external wear such as rips, cuts and tears.
- Internal damage is indicated by a thickening of the sling or the presence of grit and dirt
- Damage to protective coating of the sling.
- Damage caused by high temperatures, sunlight or chemicals , oils (which is indicated by discolouration).
- Damage to the label or stitching.
- Damage to the eyes.
- Annual test date.

Synthetic Slings

DISCARD A SYNTHETIC SLING IF:

- The label has been removed or destroyed.
- There is any damage to the sleeve or protective coating.
- A sling comes into contact with acid.
- A polypropylene sling comes into contact with an organic solvent such as, paint, coal tar or paint stripper.
- There are any visible cuts on the sling.

Storage and care of lifting equipment

Lifting equipment must be stored:

- In a clean, dry, well ventilated place
- Off the ground or floor
- Away from direct sunlight
- Away from extreme heat.
- Away from people welding cutting
- Not stored in same location as chemicals such as paint and solvents

Lifting and Slinging

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NEVER

- Wrap a tagline around your hand or body
- Leave a suspended load unattended
- Pass loads over people
- Use lifting accessories for towing or pulling
- Ride or climb on machines or suspended loads
- Lift near power lines
- Stand or walk underneath a suspended load – Golden Rule # 2

Lifting and Slinging

The Rigger / Signalman is responsible for :

- Attaching and detaching the load to and from the crane
- The use of correct lifting accessories
- Directing the safe movement of the crane and load
- Must be easily identifiable by all personnel – Red Helmet and vest with Rigger / Signalman on back
- Ensure lifting zone is established and maintained and barricaded where needed

Crane Movement

Keep clear of the swing radius of the crane –
Make sure there are barriers to prevent persons entering the swing radius

Crane Movement

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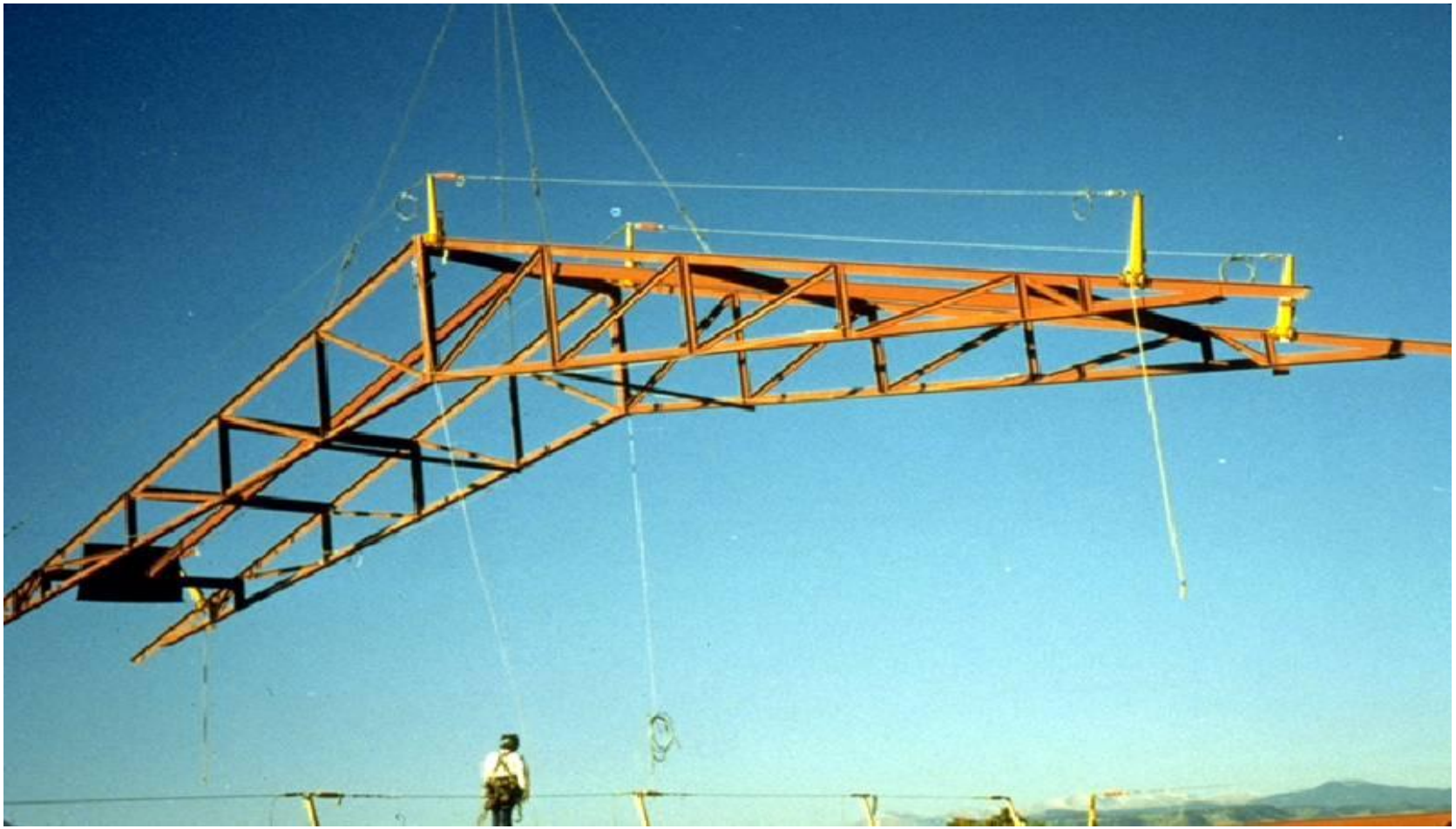

Don’t stand under a suspended load
Golden Rule # 2

Things that can go wrong

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Things that can go wrong

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Inadequate maintenance or inspection

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Never Ride the Hook

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Crane signals

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STOP

Crane signals

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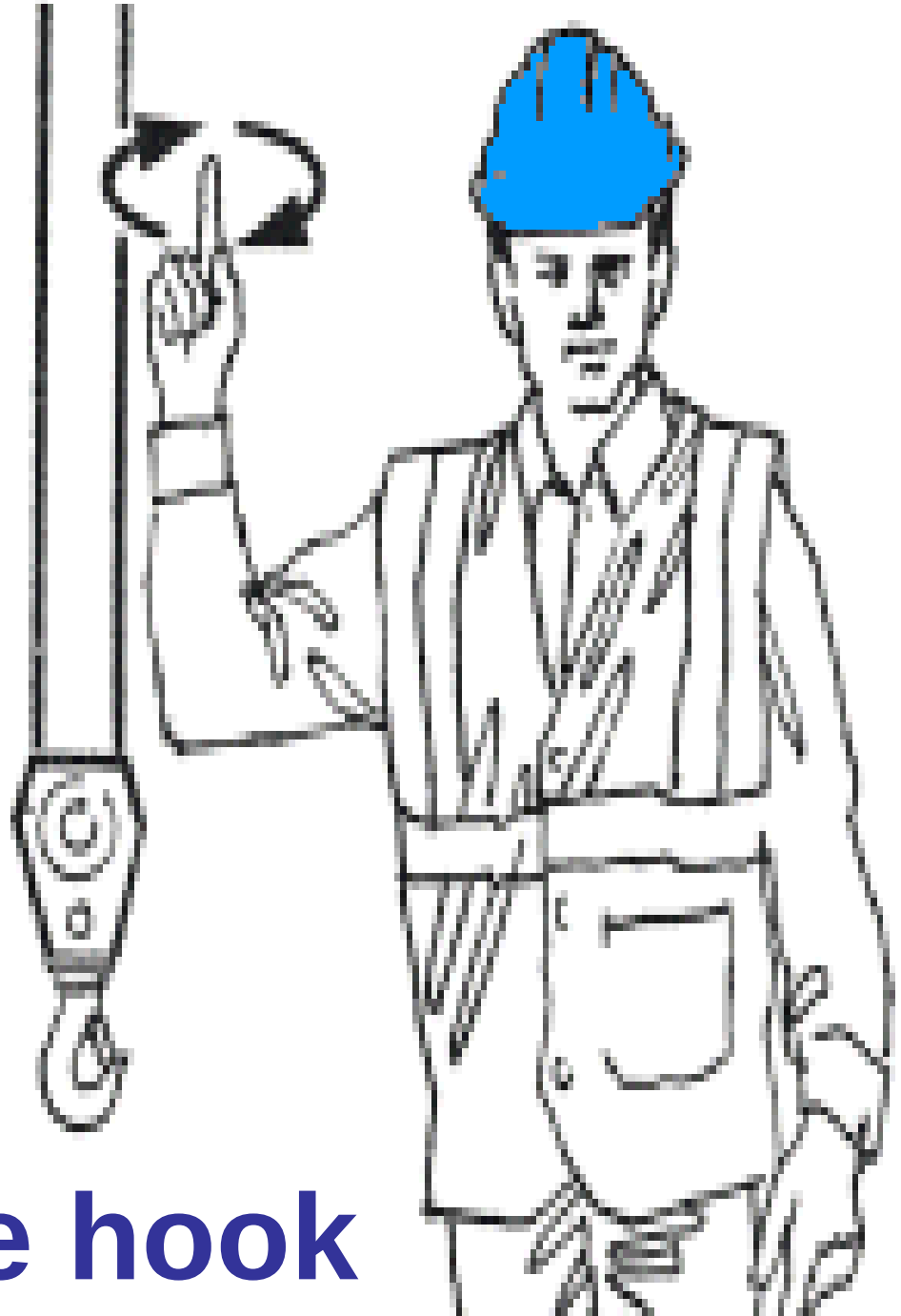

Wire up

Or

Up on the hook

Crane signals

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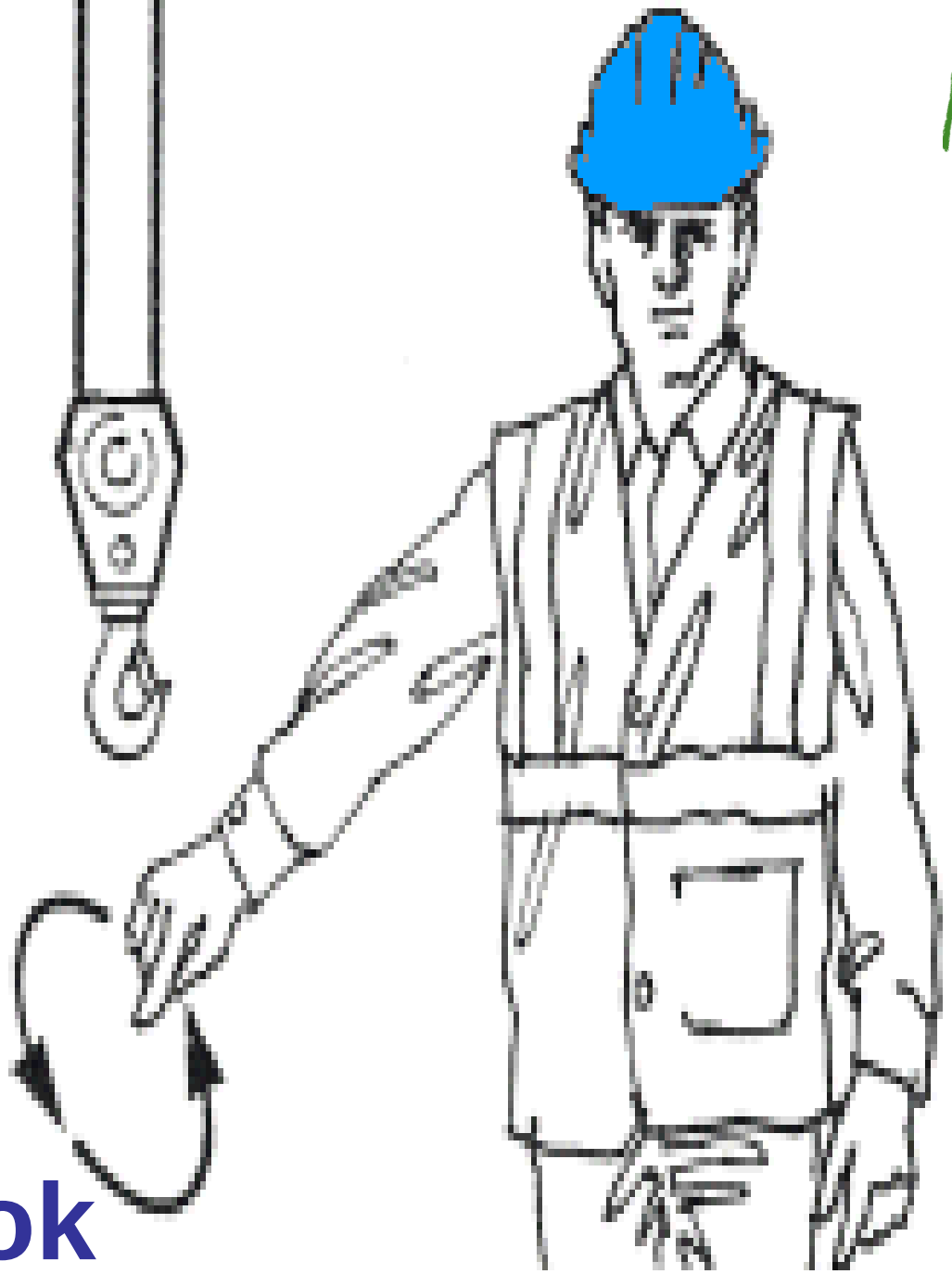

Down hook

Crane signals

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Jib up

Crane signals

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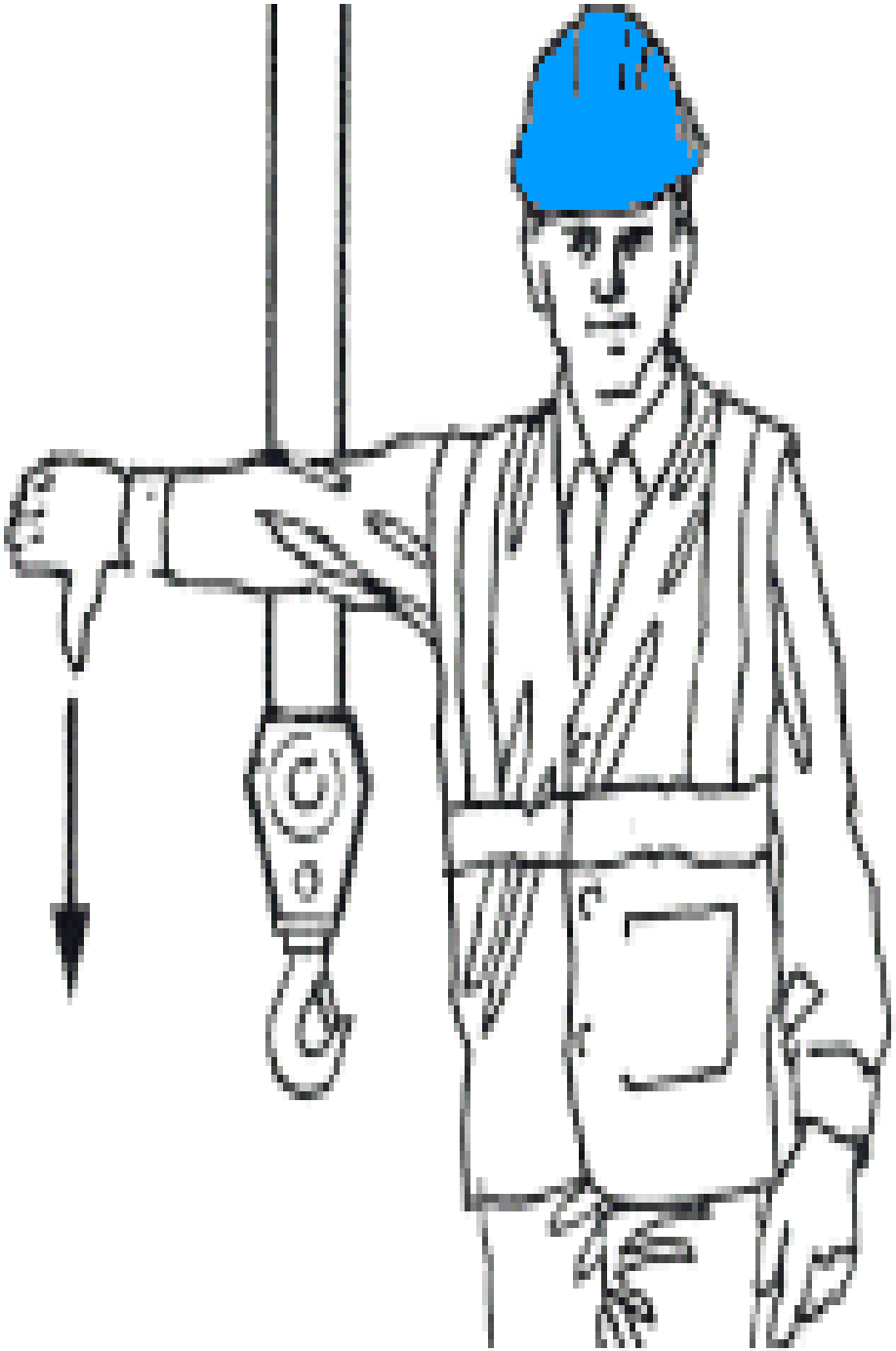

Jib down

Crane signals

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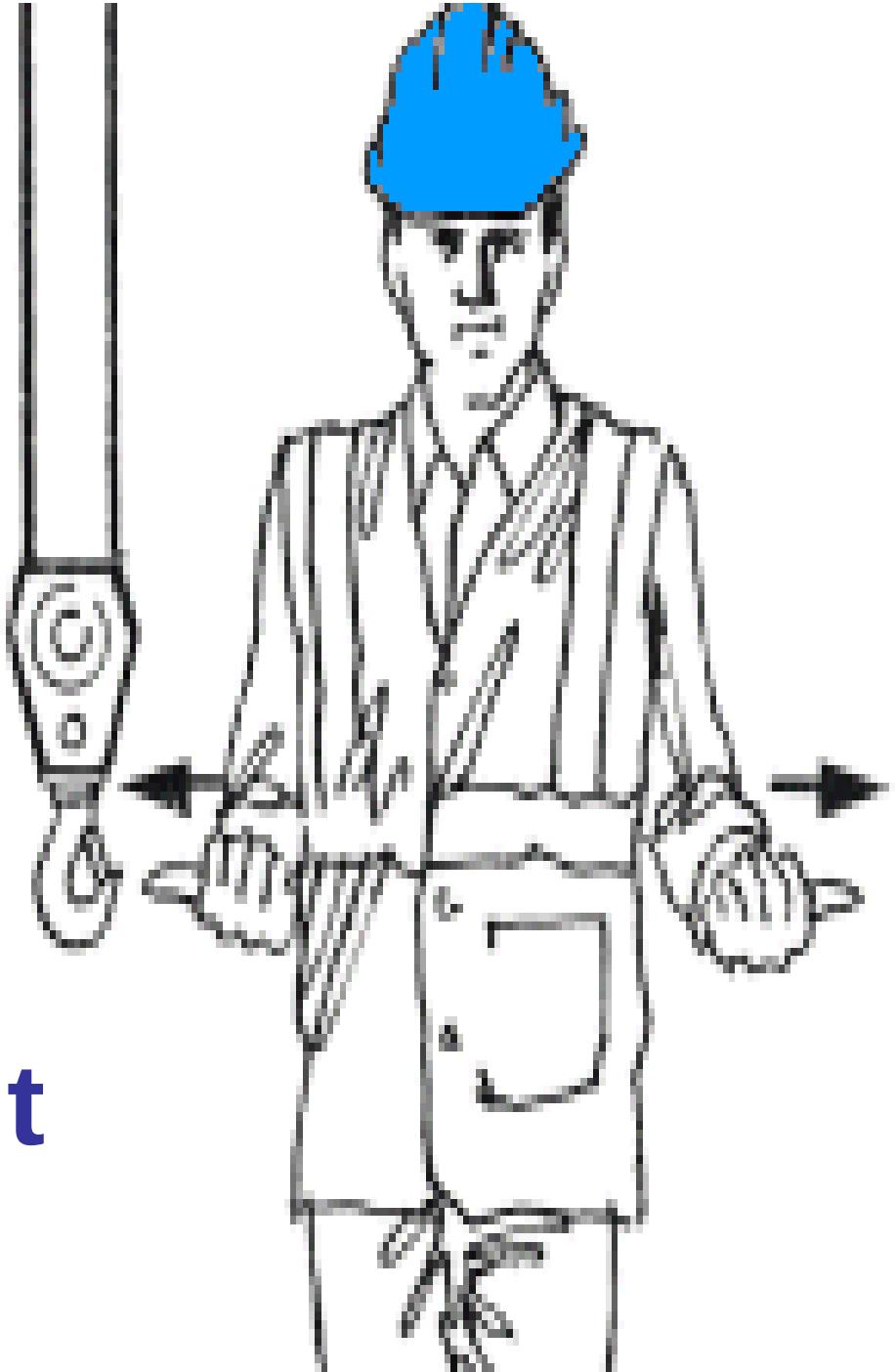

Boom out

Crane signals

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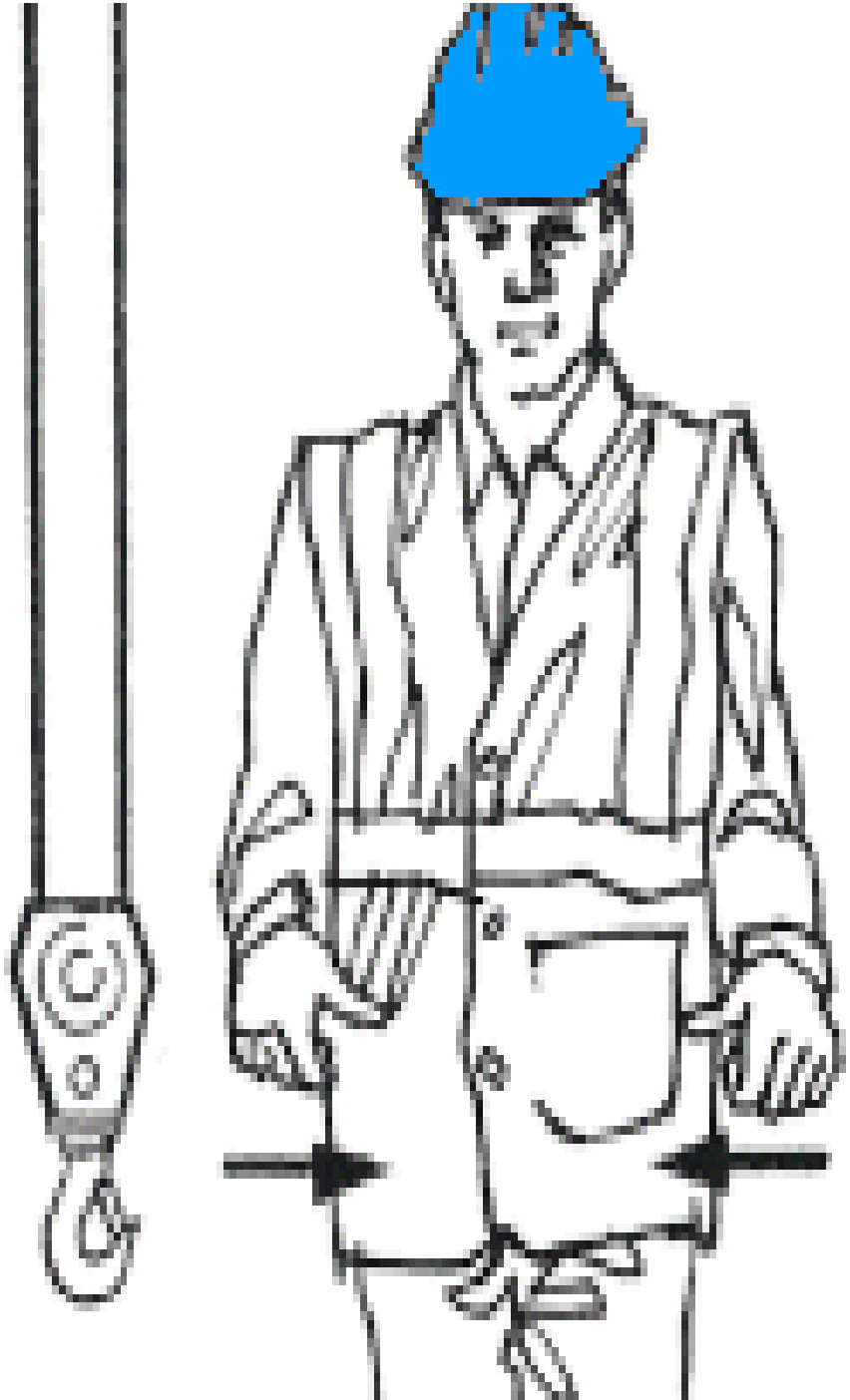

Boom in

Crane signals

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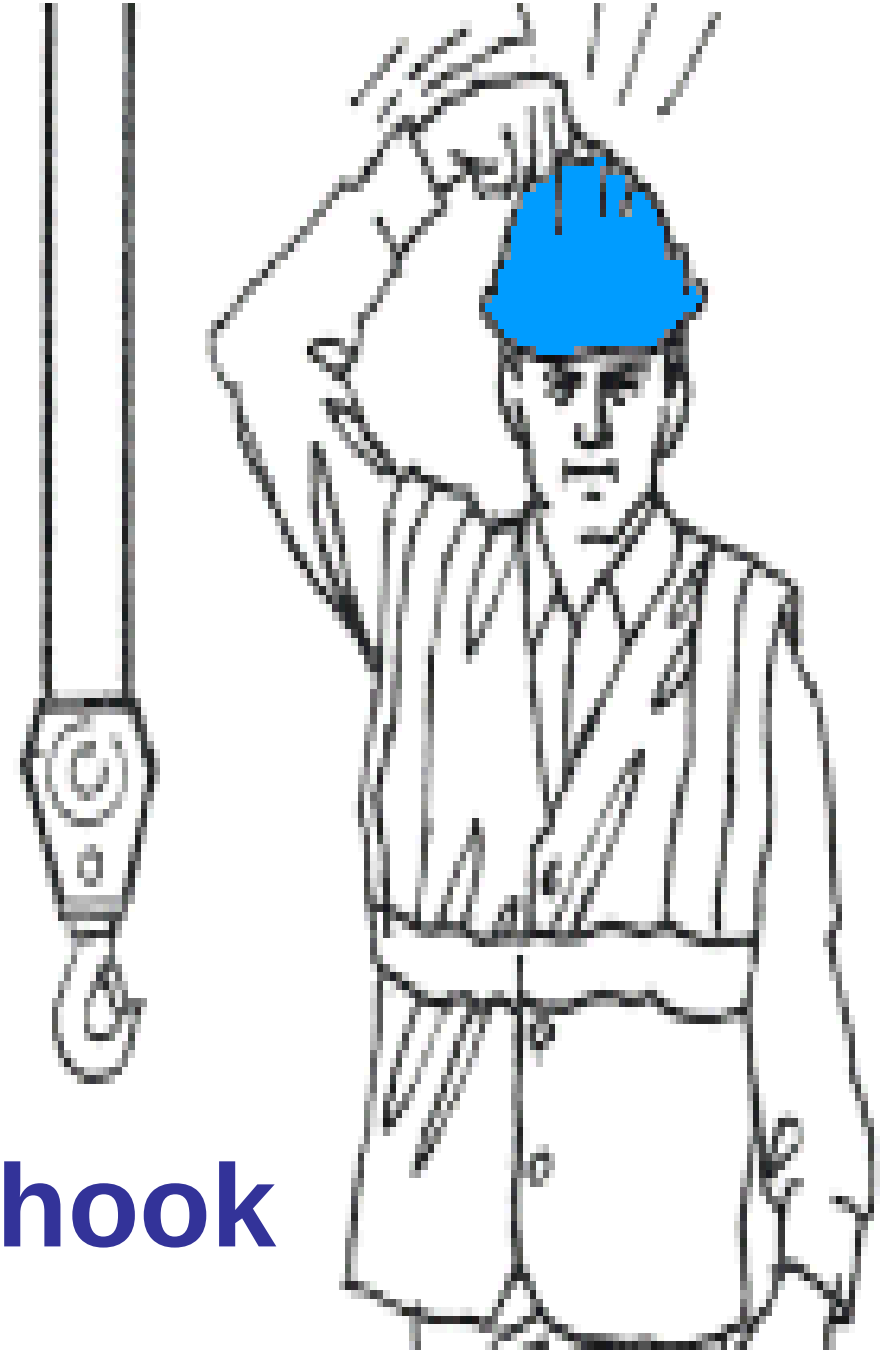

Use main hook

Crane signals

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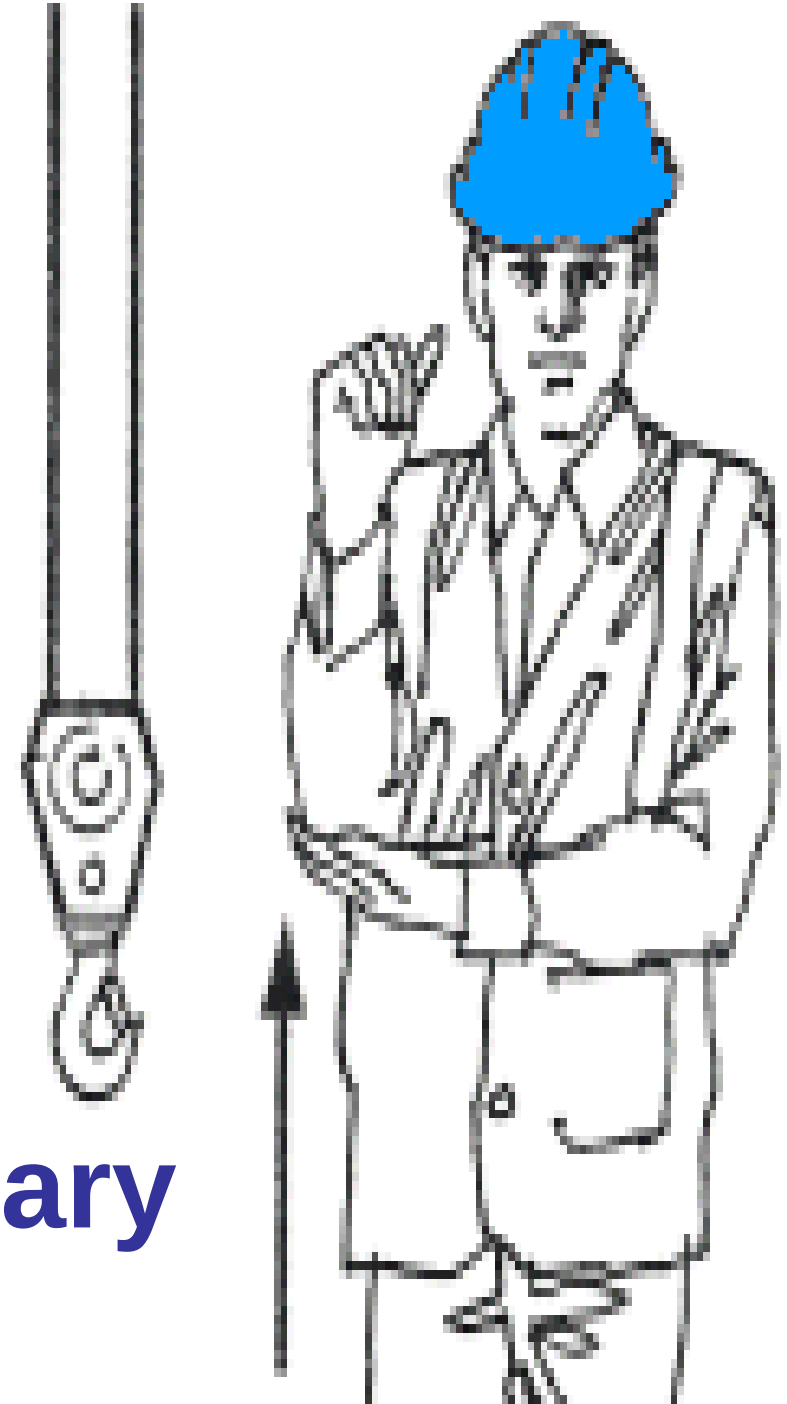

Use auxiliary hook

Crane signals

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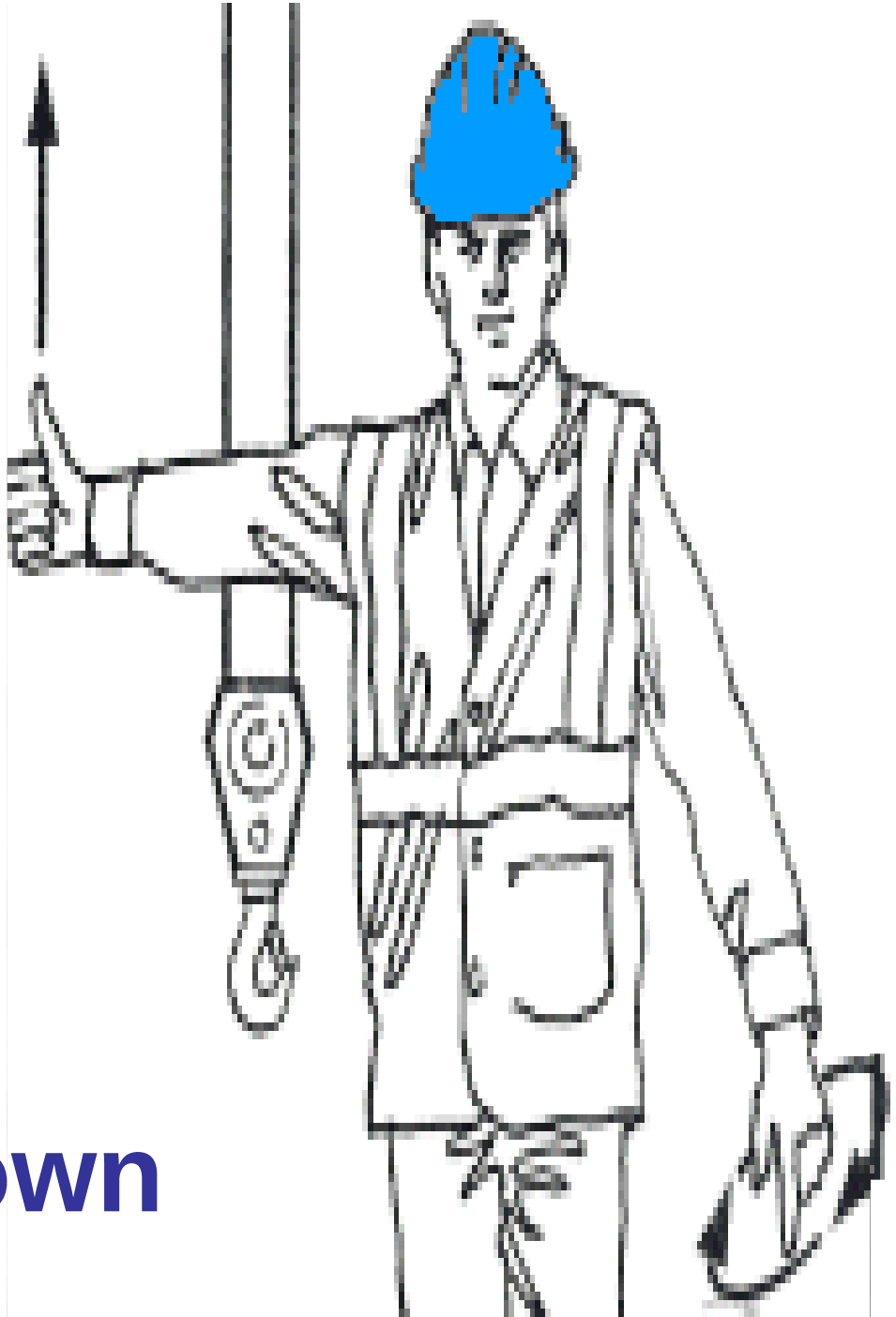

Jib up

Hook down

Crane signals

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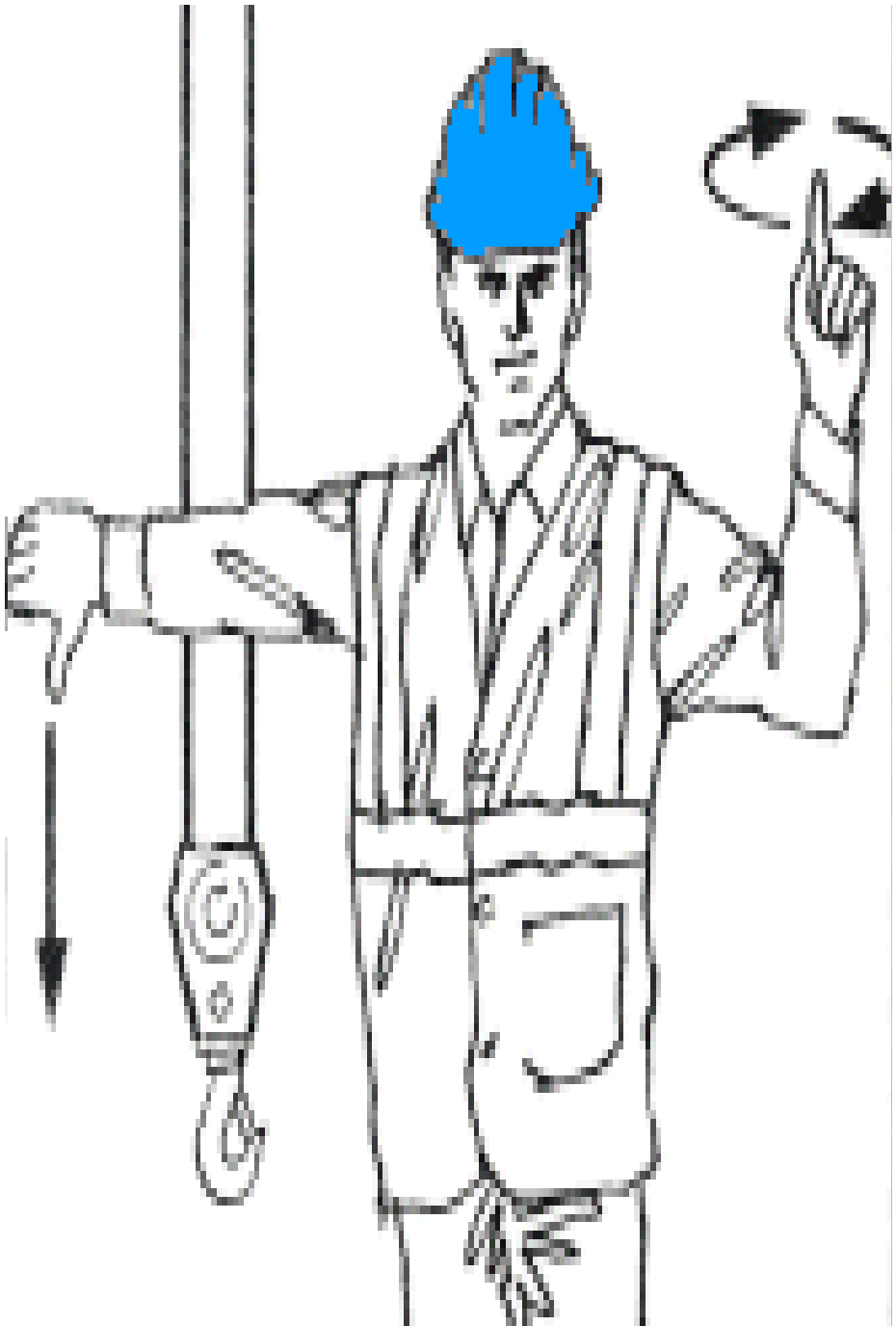

Jib down

Hook up

MCD Requirements

- Lifting and Slinging K012-020[SIN].
- Operating Cranes K015-020[SIN].
- Lift Plans are required for all lifts over 75% of crane capacity or when a 2 crane lift is required or when working near high voltage equipment.
- Approved Lifting Permit – (valid for one shift only).
- Lifting crew must be appointed to position and certified competent, hold the relevant Singapore qualification (ticket).
- Must be easily recognised by coloured helmet, fluoro vest with position name on the back of the vest i.e. Lifting Supervisor, Rigger / Signalman or Banksman.