Construction Skills Training Centre

We are here to improve your future

CPCCLHS3001A
Licence to operate a personnel and materials hoist

For information on the courses the CSTC offer, please contact:
Brisbane, PO Box 51, Moorooka QLD 4105
Phone: 07 3373 8888, Fax: 07 3373 8899 or Email: brisbane@cstc.org.au

Quality instruction, service, fairness and integrity - always

Our Purpose

CSTC's purpose is to ensure the building and construction industry's long term investment in the workforce through maintaining a commitment to the training and ongoing development of industry workers. CSTC encourages individuals to achieve the highest level of skill and knowledge possible in their chosen vocational area, therefore resulting in improved self esteem, personal growth, employment opportunities, safety into the workplace and quality of life.

Vision

CSTC strives to be recognised as a learning centre of excellence for vocational education and training. We are an organisation that continually strives to achieve the highest possible standards of education, training and consultancy services specific to the building, construction and other related industries.

CSTC provides training in the following areas:

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- High Risk Work Licenses – Scaffolding, Dogging, Rigging, Crane operation
- Forklift operation
- Confined Spaces
- First Aid
- Asbestos Removal
- Concreting
- Steelfixing
- Road Construction
- Bridge Construction
- Tunnel Construction
- Pipe Laying
- Trenchless Technology
- Bitumen Surfacing
- Plant Operations
- And much more!

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This learning product could only be made possible because of the dedicated CSTC team.

Unit information

CPCCLHS3001A Licence to operate a personnel and materials hoist

Unit descriptor This unit specifies the outcomes required to operate a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation. Included in this definition are situations where winches may be configured to operate as hoists for the transportation of personnel for licensing purposes..

Prerequisite units Nil

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
ELEMENT	**PERFORMANCE CRITERIA**
1. Identify OHS legislative requirements.	1.1. Applicable ***OHS legislative requirements*** relevant to own work, role and responsibilities are identified and explained. 1.2. Duty of care requirements are identified. 1.3. Own responsibilities to comply with ***safe work practices*** are identified and explained.
2. Identify construction hazards and control measures.	2.1. Basic principles of risk management are identified. 2.2. ***Common construction hazards*** are identified and discussed. 2.3. ***Measures for controlling*** hazards and risks are identified.
3. Identify OHS communication and reporting processes.	3.1. Hoist is operated according to procedures. 3.2. Communication methods associated with hoist movements are conducted according to procedures and the appropriate standards. 3.3. Loads and load distribution are continually monitored to ensure that the hoist is operated within its capacity according to procedures. 3.4. Hoist movement is monitored constantly ensuring safety to appropriate personnel and hoist stability. 3.5. ***Unplanned and/or unsafe situations*** are responded to in line with procedures.

ELEMENT	PERFORMANCE CRITERIA
4. Shut down and secure hoist.	4.1. Hoist is ***shut down*** according to procedures. 4.2. All fences and gates are secured according to procedures. 4.3. Routine post -operational checks are carried out according to procedures. 4.4. Power is isolated and secured against unauthorised access. 4.5. All damage and defects are reported and recorded according to procedures and appropriate action taken.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- accurately record and maintain information relating to personnel and materials hoist operations
- communication techniques in the workplace including bells, lights, intercom and use of two-way radios
- conduct personnel and materials hoist operations
- operate emergency brake and decent system
- hazards associated with the operation of the personnel and materials hoist are identified, risks are assessed and effective hazard prevention/control measures for those hazards identified and put into place
- inspect personnel and materials hoist equipment, safety equipment and installation for safe operation including general maintenance
- communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- weight of the load is determined from labels, markings or load paperwork
- level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of processes for the hoist class
- hoist operations and operating techniques
- understanding of the hierarchy of hazard identification and control
- materials safety data sheets and requirements for safe movement of materials
- organisational and workplace standards, requirements, policies and procedures for conducting operations for the hoist class
- procedures for the recording, reporting and maintenance of workplace records and information
- rated capacity and working load limits
- typical routine problems encountered in the operation of a personnel and materials hoist, inspection techniques and adjustments required for correction.

Overview of assessment **Critical aspects for assessment and evidence required to demonstrate competency in this unit**	A person who demonstrates competency in this unit must be able to provide evidence of the ability to: • comply with OHS licensing legislation • effectively communicate and work safely with others in the work area • identify hazards associated with the operation of the hoist and put in place effective hazard controls for those hazards identified • determine load weights • effectively conduct personnel and materials hoist operations to include the tasks of raising and lowering loads with hoist; in conjunction with awareness of the limitations of the hoist according to manufacturer's specifications • ensure hoist controls are attended throughout operation. • effectively conduct emergency lowering of the hoist according to the emergency lowering procedure • effectively conduct pre operational and shut down checks of the personnel and materials hoist (particular awareness of controls, alarms and lockout devices).

RANGE STATEMENT

Bold italicised wording, if used in the performance criteria, is detailed below.

Hazards may include but are not limited to:	• ground conditions (e.g. condition of pavement, slopes) • overhead hazards (e.g. power lines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • environmental conditions (e.g. wind, lightning, rain) • hoist overload • other specific hazards (e.g. dangerous materials).
Hazard prevention/control measures may include:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes application of the hierarchy of control, the six step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
Appropriate standards may include:	• codes of practice • legislation • Australian standards • manufacturer specifications.

Hoist includes:	• the operation of a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation. Included in this definition are situations where winches may be configured to operate as hoists for the transportation of personnel.
Procedures may include but not limited to:	• assessing the risks involved • consulting and reporting ensuring the involvement of relevant workers • controlling the hazard • identifying hazards • reviewing to identify change or improvement.
Communication methods may include but not limited to:	• verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol • interfloor/level communications.
Appropriate personnel may include but not limited to:	• those associated with the operations of the personnel and materials hoist • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.
Service logbook may include but is not limited to:	• any logbook • service book • history record system where the service and maintenance history is kept.
Routine pre start operational checks may include but not limited to:	• ground stability • tower ties/guys are secure • power supply is covered by earth leakage protection • power leads secured above ground level and not attached to scaffolds or building structure • tower guides are clean and free of rust and damage • signs are clearly displayed and legible • brakes and drive mechanism • overhead protection • intercom and signalling systems • barriers, fencing and gates • fuels, oil and water • lubrication (grease) • hoist rope

	• sheaves and anchorage points.
Communication equipment may include but not limited to:	• fix frequency two-way radios • bells • buzzers • lights. • **NB**: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the hoist.
Safety devices may include but not limited to:	• emergency braking system • overrun limits • gate interlocks • personnel access interlock on hoist roof.
Appropriate standards may include but are not limited to:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Unplanned and/or unsafe situations may include but not limited to:	• failure/loss of control e.g. power supply, braking system • failure of equipment e.g. hydraulic system, broken hoist cable, damaged gear drive • environmental conditions e.g. wind, lightning, storms.
Shut down may include but not limited to:	• platform positioned at base of tower • lock on manual safety brake • landing gates secured to prevent unauthorised access • power isolated from control panel • mains power supply isolated and secured • internal combustion engine idled to stabilise temperature • engine turned off • fencing/barriers around base secured to prevent unauthorised access • key removed (where applicable).

CONTENTS

FORMAL TRAINING REVISION ACTIVITIES

This Activity MUST be completed prior to logging any hours in the log book and prior to attending the CSTC Course.

Name: _____ Date: _____

ALL QUESTIONS ARE TO BE ATTEMPTED

Question 1. **Give at least three (3) defects that could be found on the blocks of running gear.**

Answer **1.** _____ ❑

2. _____

3 _____

Question 2. **Why would it be important to carry out a test run on the hoist/winch prior to operation?**

Answer _____ ❑

_____

_____

Question 3. **What overhead protection must be provided for the hoist/winch driver?**

Answer _____ ❑

_____

_____

Question 4. **In the case of an emergency, why is it important to communicate with other site personnel prior to leaving the control station?**

Answer _____ ❑

_____

_____

Question 5. **What protection device is required to be fitted to the hoist to protect personnel in the event of the hoist wire breaking?**

Answer _____ ❑

_____

_____

Question 6. **What is the purpose of an interlock device on the hoist gates?**

Answer _____ ❑

_____

_____

Question 7. **What distance must:**

Answer **a. The handrail be set back at the base of the tower; and** ❑

_____

b. What height is the handrail?

_____

Question 8. **Name the moving parts on the hoist/winch where any sudden abnormal noise could be dangerous.**

Answer _____ ❑

_____

_____

Question 9. **What would you do if you heard any sudden loud noise from the tower area?**

Answer _____ ❑

_____

_____

Question 10. **Form workers are erecting formwork on an upper level and are close to the edge of the building. What are the most dangerous hazards?**

Answer _____ ❑

_____

_____

Element 1 – Identify OHS legislative requirements

Chapter objectives - this is what your audience will learn in this chapter/ section/ element:

- ✓ Applicable ***OHS legislative requirements*** relevant to own work, role and responsibilities are identified and explained.
- ✓ Duty of care requirements are identified.
- ✓ Own responsibilities to comply with ***safe work practices*** are identified and explained.

Element 2 – Identify construction hazards and control measures

Chapter objectives - this is what your audience will learn in this chapter/ section/ element:

- ✓ Basic principles of risk management are identified.
- ✓ ***Common construction hazards*** are identified and discussed.
- ✓ ***Measures for controlling*** hazards and risks are identified.

Element 3 – Identify OHS communication and reporting processes

Chapter objectives - this is what your audience will learn in this chapter/ section/ element:

- ✓ Hoist is operated according to procedures.
- ✓ Communication methods associated with hoist movements are conducted according to procedures and the appropriate standards.
- ✓ Loads and load distribution are continually monitored to ensure that the hoist is operated within its capacity according to procedures.
- ✓ Hoist movement is monitored constantly ensuring safety to appropriate personnel and hoist stability.
- ✓ ***Unplanned and/or unsafe situations*** are responded to in line with procedures.

Element 4 – Shut down and secure hoist

Chapter objectives - this is what your audience will learn in this chapter/ section/ element:

- ✓ Hoist is ***shut down*** according to procedures.
- ✓ All fences and gates are secured according to procedures.
- ✓ Routine post -operational checks are carried out according to procedures.
- ✓ Power is isolated and secured against unauthorised access.
- ✓ All damage and defects are reported and recorded according to procedures and appropriate action taken.

CPCCLHS3001A LICENCE TO OPERATE A PERSONNEL AND MATERIALS HOIST

PURPOSE

To be used as a reference manual when training Hoist Operators, Scaffolders and Riggers in all aspects of:

- builders materials hoists and
- builders personnel and materials hoist

The aim is to ensure that hoists are erected, used, and maintained in a safe and efficient manner in compliance with:

- National Occupational Health & Safety Certification Standards for Users & Operators of Industrial Equipment;
- manufacturers specifications;
- Australian Standards; and
- Industry Standards.

NOTE: **This manual is a teaching aid only and should not be used as an erection guide.** The complete erection manual for the type and model of hoist supplied by the manufacturers should only be used. All permits or requirements of the Division of Workplace Health and Safety must be met prior to erection.

INTRODUCTION

Hoists are used to raise and lower loads and personnel on a platform or in a cage for the construction of multi story buildings. Originally they carried materials only and used a winch to raise and lower loads. Later they were built within a purpose built tower and were capable of moving both personnel and materials. Some large models even incorporated a crane jib at the top of the tower for lifting loads that did not fit in the hoist cage.

Today the most common type of hoist in use would be the ALIMAK hoist with either two or three hoist motors. The method of drive is a ‘rack and pinion’ system. **All three types are covered in this manual.**

DESIGN

Hoist towers are slender and designed to take vertical force but have only a limited capacity to take horizontal forces. All horizontal forces must therefore be transferred to fixed anchor points of sufficient strength**. Anchor points can be on the building or on the ground and attached to guy ropes.**

The design of all types of construction hoists must comply with the relevant and appropriate Australian Standards (A.S.1418.1 &A.S.1418.7)

Materials only hoists and men and materials hoists have a design wind speed limitation and must not be erected, climbed, used or dismantled at wind speeds in excess of those specified by the **manufacture's specifications.** This limitation is generally 15m/sec (33mph or 54km/hr) unless otherwise noted.

External Guided Cantilevered Platform

Cantilevered platform hoists run up and down the outside of the tower and can be materials only or personnel and materials.

External guided cantilevered platform (materials only) hoists use either a wire rope hoisting system to raise the platform or a 'rack and pinion' hoisting system.

Internal Guided Platform

Internal guided platform (tower) hoists run up and down inside the tower in guides and use a wire rope hoisting system to raise the platform.

A jib can be attached to tower hoists to raise long loads.

CERTIFICATION

Operator

- H.M – Materials Only Hoist
- H.P – Materials or Personnel Hoist

Erectors

The erection of all hoists must be carried out by suitably qualified riggers or scaffolders.

Basic Scaffolder
Restricted to the erection of Materials Only Hoists with a maximum S.W.L. (Safe Working Load) of 500 kilograms.

Basic Rigger
Hoists other than those with jibs and self climbing hoists

Intermediate Rigger
All types of hoists

Hoist Operators Must Know

How to:

- operate hoists safely;
- identify any structural or operating defects;
- ensure that maintenance is carried out; and
- take effective action in the case of an emergency.

Assessment

To gain a certificate of competence as a hoist operator a person must:

- learn to operate a hoist under the supervision of a certificated operator; and
- pass an examination conducted by an accredited officer for the division of workplace Health and Safety

The examination will include;

-
- safe operation;
- correct set-up; and
- emergency procedures.

And will consist of:

- theory examination; and
- practical examination

You will be required to achieve competency in both areas of the assessment to be eligible to apply for a certificate of competency as a hoist operator and have a hoist available for the examination.

HOIST TYPES

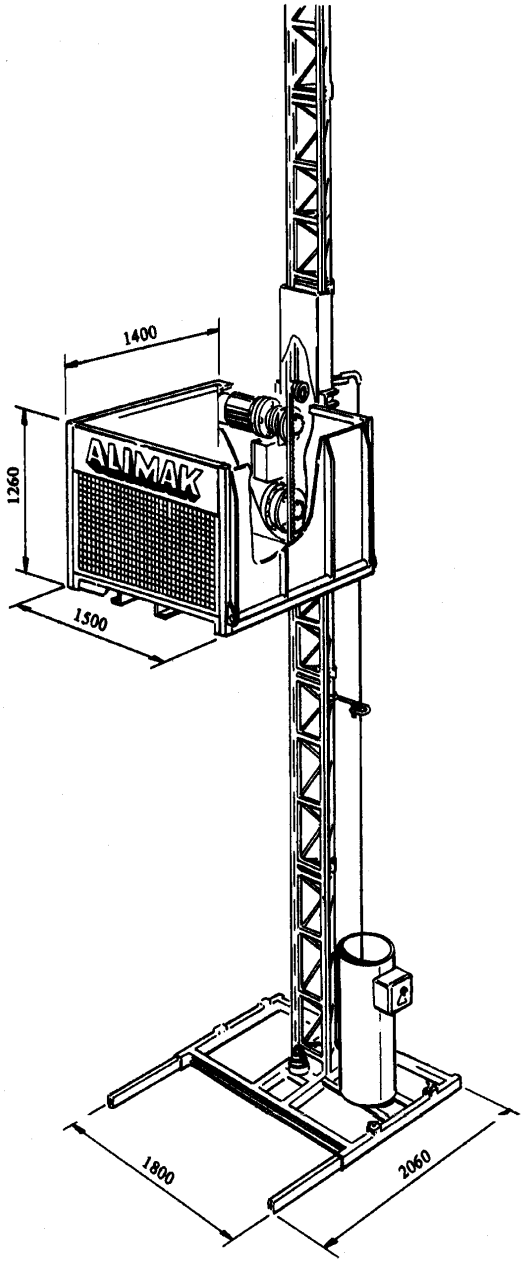
Alimak – Builder's Hoist - For materials only

These cantilevered hoists may be raised using a rack and pinion system or a wire rope hoisting system.

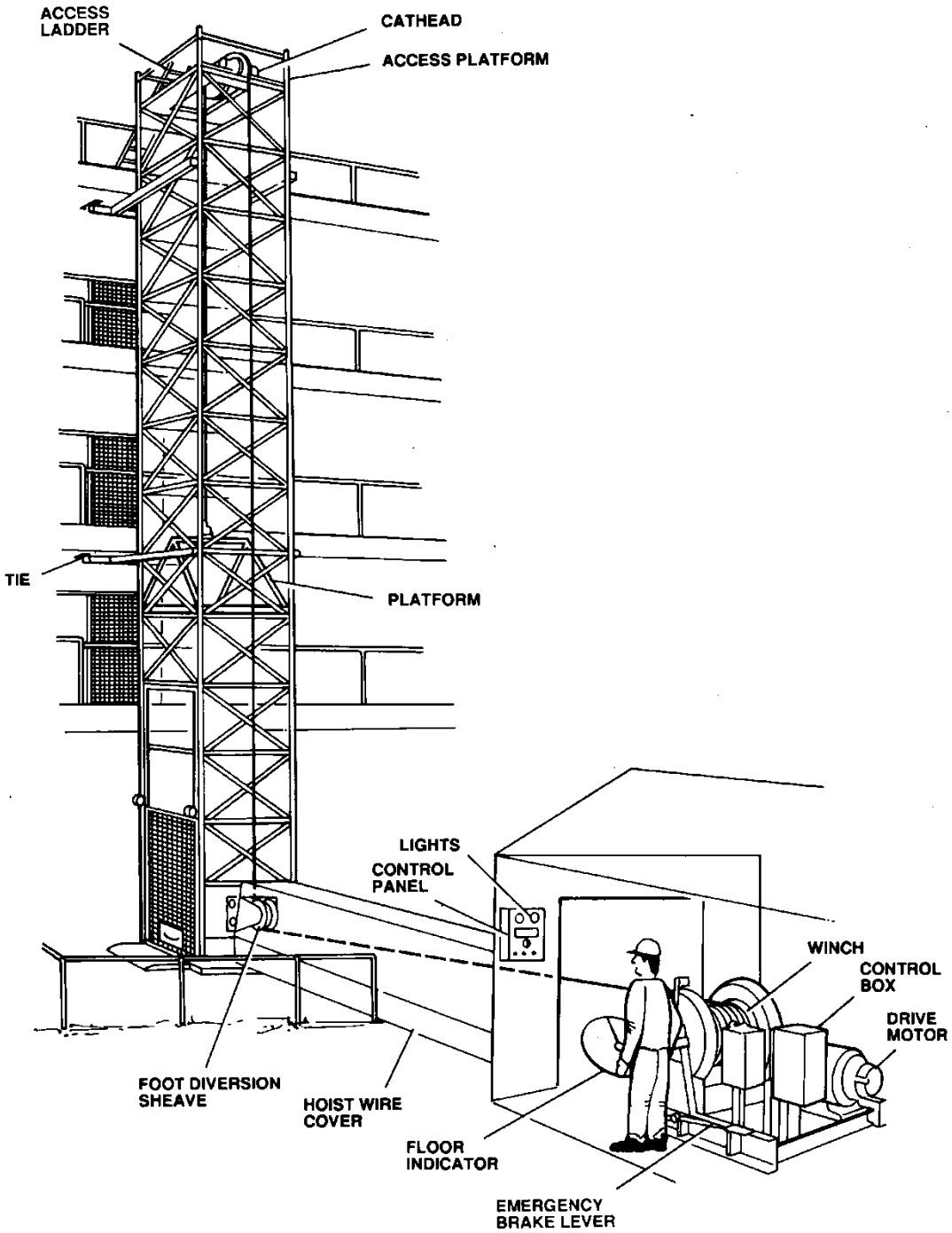
Technical Data

CAPACITY	
Pay-load capacity	500 kg
Erection load	500 kg
Speed 50/60 Hz	26/31 m/min.
Max. lifting height	100 m
Erection crane capacity	50 kg
Safety device	type GF
CAGE DIMENSIONS	
Internal width x length	1.4 x 1.5 m
ELECTRICAL DATA	
Power supply range	380 – 480 V 50 or 60 Hz, 3-Phase
At 380 V/50 Hz:	
Power supply fuses	16 Amp.
Rated power cont. duty	1 x 4 kW
Rated power 15 % int. duty	1 x 6 kW
Starting current	59 A
Power consumption	8 kVA
Data at other voltages on request	
WEIGHTS	
Base unit weight incl. enclosure	900 kg
Base unit weight excl. enclosure	750 kg
Mast section	46 kg
Mast section length	1508 mm

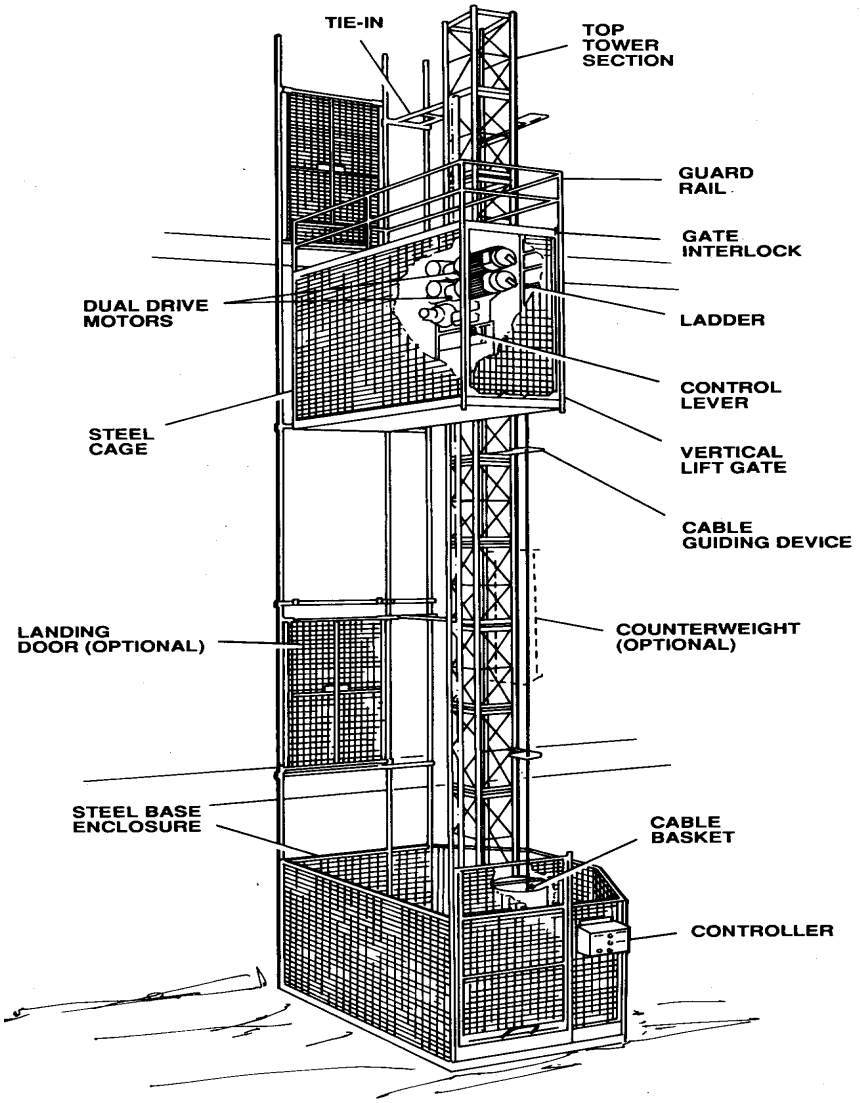
Optional Equipment: Ground Enclosure
Landing Equipment
Transport Equipment



Armstrong Hoist – Internal Guided - Materials only



Alimak Hoist – rack and pinion drive - cantilevered platform personnel and materials hoist



Rules and Operational Requirements

The following information is common in the setting up and operation of all hoists.

Prior to the erection of any hoist, operational planning must be carried out to ensure all statutory rules are followed, all site requirements covered and any hazards are identified.

To ensure a full understanding of the requirements this planning needs to involve:

- Management;
- WPH&S officer; and
- Hoist operator.

It is important that the hoist/winch driver co-operation with workplace rules and procedures, this is to ensure compliance with site requirements and legislative requirements. Every person in the workplace has obligations / duties of care under the Workplace Health and Safety Act.

Log Books

All machines must have a log book. Details of all maintenance and alterations performed on the machine must be entered in the log book so the operator can see at a glance if there has been any problems. **All defects must be reported to the authorised person** and repaired according to manufacturer's specifications.

Failure to co-operate can result in disciplinary action being taken against the offending parties by both the relevant site personnel and statutory authorities.

Log books are used to record the history of the equipment.

Servicing

Servicing must be carried out at intervals and as recommended by manufacture's specifications.

Operational Planning

The following must be taken into consideration when preparing an operational plan.

- Site requirements. (induction)
- Job requirements or task to be performed
- Priorities;
- Workplace rules and procedures;
- Work method statement;
- Identify any hazards involved; and
- Hazard control measures.
- Emergency procedures

IDENTIFY ANY HAZARDS INVOLVED

What to look for:

- Un-level or soft ground;
- Recently filled trenches;
- Underground services – telecommunication pits, etc.
- Any other personnel working in close proximity of the hoist;
- Power lines;
- Service lines – water, steam etc.
- Surrounding structures – buildings, awnings, scaffolds etc.;
- Obstructions – trees;
- Facilities – walkways, lunch rooms, toilets;
- Other equipment – traffic flow; and
- Dangerous materials (including items carried in hoist).

Hazard Control Measures

Your hazard control strategy plan should include the following items

- the task being preformed;
- any site hazards;
- all personal protection (PPE);
- barriers and barricades;
- warning signs;
- traffic controls;
- lights and or lighting;
- public safety; and
- emergency plan.

Note:Ensure your work area is well lit. lighting will be needed for night work and in darkened areas. This will ensure safe access and egress to the work site.

Pre Checks and Safe Operation

The following information is common to the safe operation of all hoists,

All hoists must be test run prior to being placed into service. This will ensure that all parts are visually checked and are operational as per the manufacture's specifications during the pre-operational checks. It is achieved by raising and lowering the car or load, checking brakes, limits, emergency brakes, lights, communication systems and all gates to ensure the interlocking system is operating correctly.

Fuel Storage

In regards to the storage of fuel to run the winch, ie. petrol or diesel; there are maximum quantities permitted to be stored at a work place.

These qualities are:

- Petrol – not more than 100 litres; and
- Diesel – not more than 50,000 litres.

NOTE: Fuel in the tank is not deemed as “storage” but is classified as “in use”.

Electric or Internal Combustion Engines

Winches with electric or internal combustion engines must not be set up near storage areas for fuel unless clearances set down by the A.S. 4230 are adhered to.

Travel Limits

All hoists must have an upper and lower cut out travel limit to prevent the hoist travelling over the top or bottom of tower.

Stability

It is important that hoist drivers are aware of the structural stability of the hoist. Hoist operators must know the different systems used to **tie or guy** hoist towers into position so that while doing the pre-checks on the hoist they can identify any faults or problems and report to the authorised person.

Secure

Hoists can be secured in a number of ways, using counterweights, welding, bolting down or the use of lashing.

Do not set a hoist up in an access way.
If a hoist goes past a doorway, window or exit, that opening must be boarded or fenced closed to prevent people leaning out and being struck by the hoist or load.

When a hoist is set up within a building, the hoist must be securely fenced on all sides, floor to ceiling, to prevent injury and a safe access provided to the hoist.

Emergency Plan

An emergency plan should be set up regarding the winch. **The emergency plan will be site specific and in line with the workplace rules and procedures.** The safety officer, winch operator and managements should all be involved. The plan should set out the operator’s duties during an emergency. A copy of this plan should be kept on the hoist so that the operator is fully aware of his or her responsibilities should an emergency arise. **The hoist may be used as a means of escape in an emergency.**

During an emergency, the operator must communicate with other site personal prior to leaving the control station. This will inform the operator as to the nature of the

emergency and lets someone at ground level know you are making your way down. You may be given instructions to stay at the station until the problem has eased.

Gates

Where a system of gates are used at different floors, gates must be inter connected electrically so that the operator will be warned when a gate is open.

Gates and lights must be installed on each floor when the hoist services more than three floors,

Minimum requirements – Gates must be at least 1.8 metres high and covered with 2.5 mm wire, 50mm mesh.

Gates can hinge outward or slide horizontally or vertically. They must have a fixed stop to prevent them closing beyond the correct position and an effective latch to make sure that they remain closed. All gates on 'materials only' hoists must be wired so that when any gate is open, 2 red lights will show at the driving station and when all the gates are closed, 1 green light will show. **(2 red lights are use in case one light fails)**

NOTE:
Some hoists have special requirements for hoists gates.

Electrical hazards

Always maintain a safe distance from electrical wires when working with cranes. **Distances to maintain from live wires are as per the code of practice 'working near live parts': under the Electrical Safety Act.**

Safe Electric/Power Line Working Distances

The different states and territories have standards and regulations to work near electric/power lines. It is important that you identify possible risks when working around electric/power lines and follow relevant safe electric/power lines working distance.

Look up and Live

Always take care when operating around overhead powerlines.

Working safely when operating machinery around electricity

Is your machinery at risk of contacting overhead powerlines

Machinery, either by design or while being operated for its intended purpose, can encroach on safety exclusion zones applicable to powerlines.

Powerline heights can vary, so always visually inspect the area for powerlines before commencing any work activity or passing near or under them.

Examples of machinery operation include, but are not restricted to: a tip truck tipping a load, a crane operating at a building site, a concrete truck pumping concrete, a backhoe, or dozer moving earth.

Exclusion zone distances

Workers and their equipment should not approach overhead powerlines any closer than the following:

Voltage	Examples	Exclusion Zone
Powerlines with voltages up to 132kV	e.g. low voltage and high voltage distribution and subtransmission lines, usually on poles	3m
Between 132kV and 330kV	e.g. subtransmission and transmission lines on either poles or towers	6m
More than 330kV	e.g. transmission lines usually on towers	8m

Although these are the minimum exclusion zone clearances required, you can reduce the likelihood of mistakes by operating machinery well clear of powerlines.

Practice safe work habits

- Be aware of Electrical Safety Legislation relating to working around powerlines. Obtain a copy of the "Code of Practice for Working near Exposed Live Parts" and ensure workers are familiar with the relevant sections for work being undertaken.
- Identify all electrical hazards, assess the risks, establish control measures, and review these control measures periodically. Control measures may include, but may not be restricted to:
  - Appropriate signage at least 8 to 10 metres either side of powerlines.
  - Visual indicators such as flag markers fitted to the powerlines (contact us for advice).
  - Ground barriers, where appropriate.
  - Informing workers of required work practices.
- Ensure operators are aware of the height of their machinery in both stowed and working positions.

Important safety tips

- Ensure workers have been suitably trained and are competent to perform the work being carried out.
- Know the location of overhead and underground powerlines at the worksite.
- Ensure exclusion zone safety clearances are maintained.
- Assign a safety observer to each work team.
- Carry out measurements well away from overhead powerlines when determining the height of machinery or equipment in both stowed and working positions.
- Lower all machinery to the transport position when relocating every time.

Consider underground electricity cables

Electricity cables can also be located underground. Prior to performing work, confirm if any underground cables present a risk.

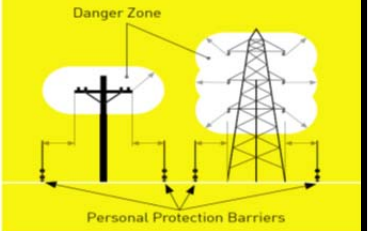
Plans and maps may help to identify underground cables, however the depth of underground cables can vary from site to site, even on the same property.

Dial 1100 before you dig. 'Dial before you dig' is an Australia-wide telephone service advising the location of some Ergon Energy and other underground cables on work sites and properties

Never move a cable without express permission from the responsible Authority.

Look out for warning signs such as orange strips, conduits, concrete slabs, orange tape, and/or soft sand as these may indicate the presence of underground cables when digging.

Exclusion zones for powerlines



- Assign a safety observer to each work team to guide machinery movements near powerlines to ensure required clearances between machinery and powerlines are maintained.
- Lower all machinery to the transport position when relocating.
- Provide workers with maps or diagrams showing the location of underground and overhead powerlines.
- Work away from powerlines not towards them.
- Contact us about marking powerlines and power poles at your workplace.

More information

Our Community Safety Team is available to discuss any questions relating to electrical safety. Call 1300 736 349.

Queensland

The Queensland Electrical Safety Regulation breaks down the distances in detail. Exclusion zones are broken down not only by size of electric/power lines but also by the competency level of the operator. This means that the requirements should be clarified with the Electrical Authority before work commences even if the distance appears to be outside the zones.

The code of practice gives the following minimum distances as guidance:

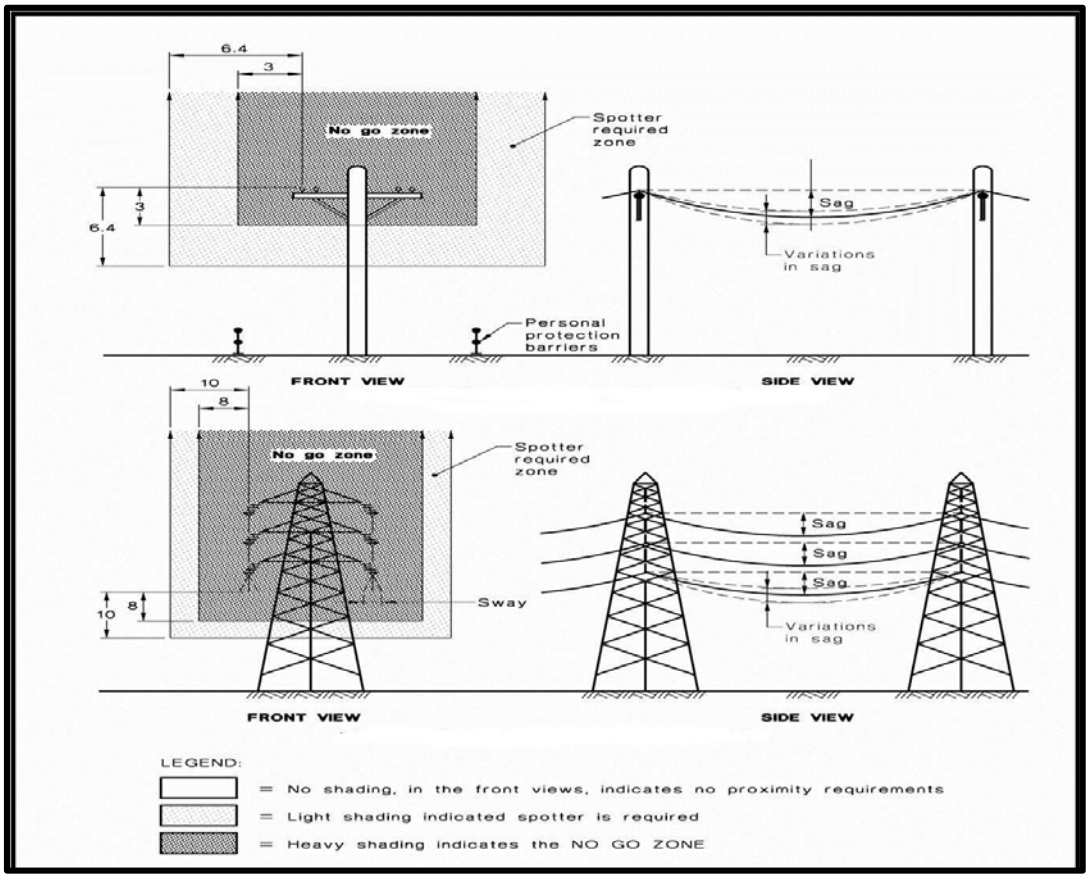
If the work you and your staff are planning has the potential to encroach into powerline exclusion zones, you should contact the relevant electrical authority (eg: Energex) for safety advice. You may require written authority to carry out the work by way of a permit or it may be issue over the phone or radio etc. Alternatively, contact the “dial before you dig” referral service who can provide the relevant information.

Exclusion zone measurements depend on the voltage of the powerline, type of work being performed and qualifications of people involved. If unsure, always seek safety advice from relevant electrical authority. Generally, workers and their equipment must maintain exclusion zones around overhead powerlines.

In Queensland the minimum safe distances you must maintain when conducting dogging operations near powerlines are listed below:

Volts	**Distance**
Up to and including 132,000	3.0 metres
Above 132,000 up to and including 330,000	6.0metres
Above 330,000	8.0 metres

Note: In all situations where a spotter is utilised that person must be appropriately trained by the regulator.

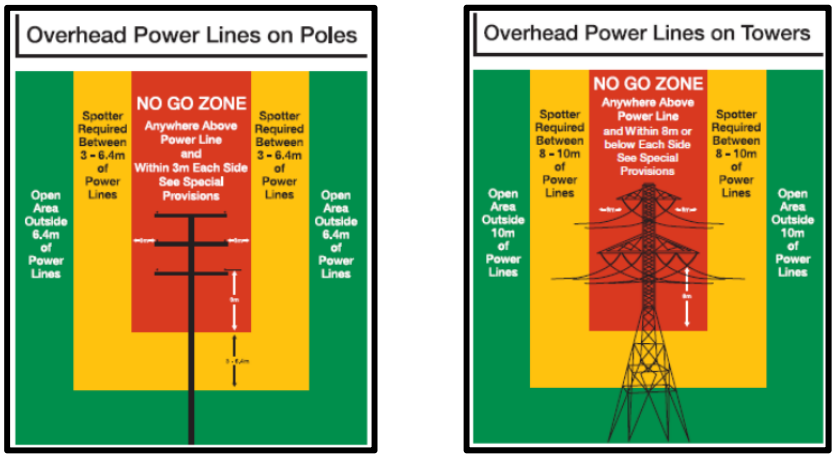


Safe working distances are state/territory specific, base on legislation. Some states and territories allow the use of a spotter and some do not. Some states/territories use actual voltage amounts to define safety distances rather than separating them into low and high voltage.

Note: ***It is imperative that you consult with the local authorities before commencing any work near or around overhead power poles/towers.***

Spotter Zones

A spotter is a competent person who watches and guides plant and equipment around electric/power lines. Check with each state authority for their spotter requirements.



Clearances from live aerial conductors

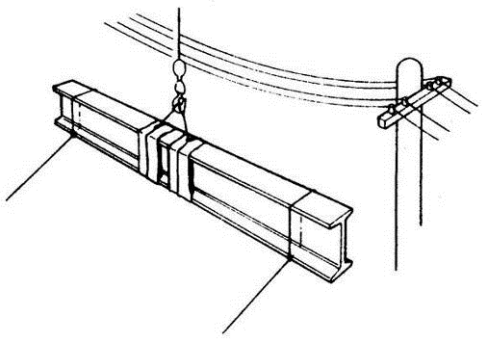
All clearances apply to relevant state unless authorised by the relevant electrical authority.

Do not set hoists up close to any electrified equipment or apparatus unless there are safeguards to ensure the safety of persons using the hoist. **Appropriate safeguards** may include placing **"tiger-tails"** (insulation) on the lines, having the **power supply isolated**, or having the **lines temporarily moved** for the duration of the operation. Other **precautions** to consider when working near power lines are: **appropriate PPE, barricades, warning signs, earthing systems, the use of a spotter and maintaining the required clearances must also be implemented.**

Keep a look out for possible contact with electrical equipment at all times while operating the hoist. During operation, if the hoist could come within any of the distances specified in the Code of practice to electrical apparatus, an observer must be appointed to keep watch and if necessary to warn the driver.

Always use a **16mm dry natural fibre rope**
as a tag line. Some synthetic rope can be a
conductors of electricity in some circumstances.

Use dry fibre rope taglines to control loads near the powerlines



Sag

The sag within a span of power line can vary greatly during the day. The amount of sag in any span is dependent on the:

- Span length
- Conductor material
- Conductor tension
- Temperature

The temperature of the line can vary dramatically within short time periods (eg. Half an hour), resulting in large increases of sag. This variation of electrical load is not normally detectable by a person observing the conductor and can result in unsafe clearances from people and structures.

In spans less than 50 metres, variations in sag can be as great as 1 metre for conductors subjected to normal temperature variations. In longer spans, the variation of sag may be up to 2 metres. The variation of sag on a transmission line supported by towers is in the order of 4 metres for the usual 400 metre span although greater sag variations may be experienced in specific instances.

Sway

All overhead power lines sway. The sway is often caused by wind passing over the line or by objects bumping the line supports or the conductor. Allowance should be made for possible increase in wind speed after work is commenced.

When working to the side of an electric line, additional clearance must be allowed for the amount of sway that can be expected in that span. The amount of sway that is possible is dependent on the sag in the span of the line. An additional distance equivalent to the maximum expected sway in the line should be added to all required clearances.

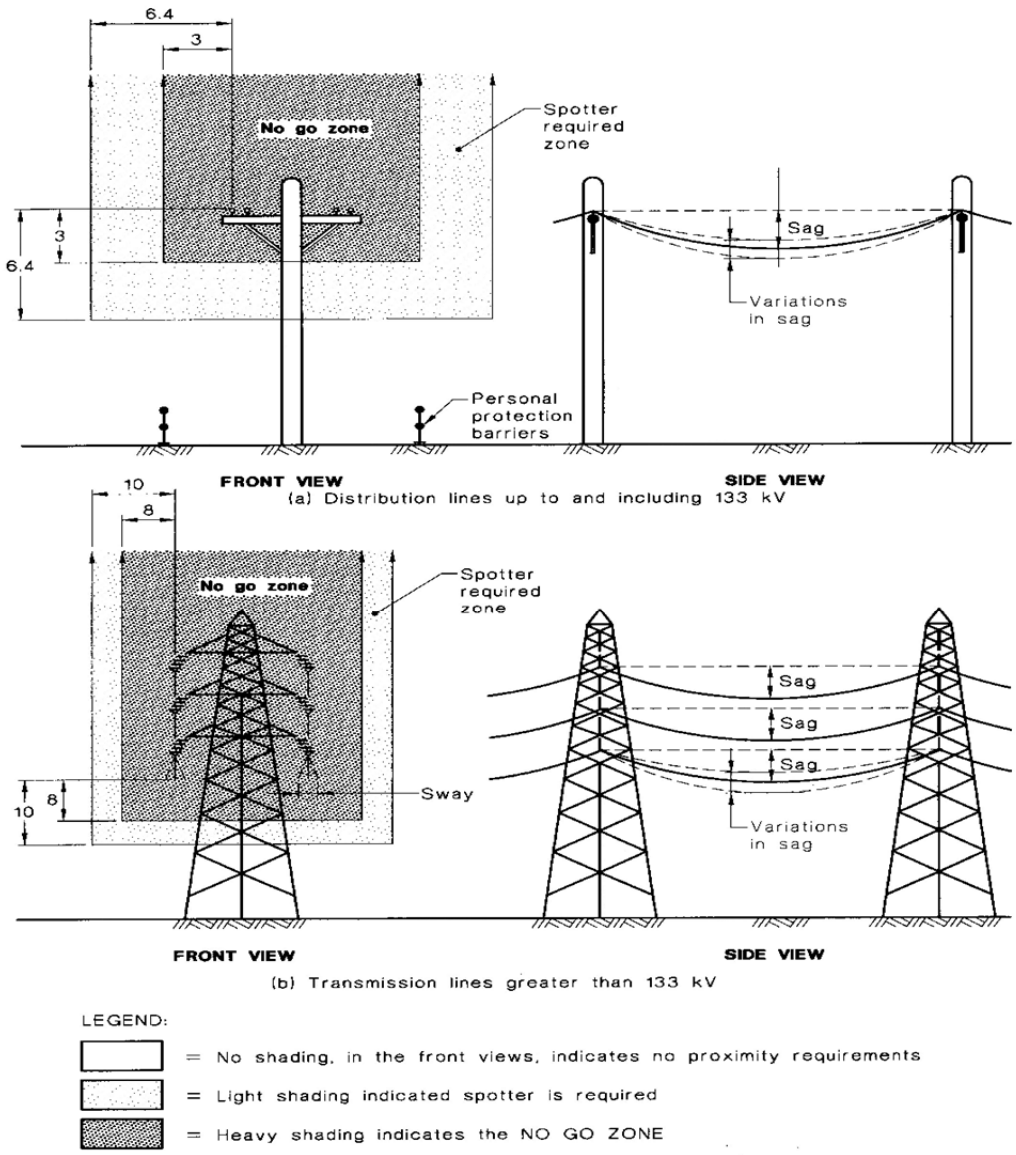
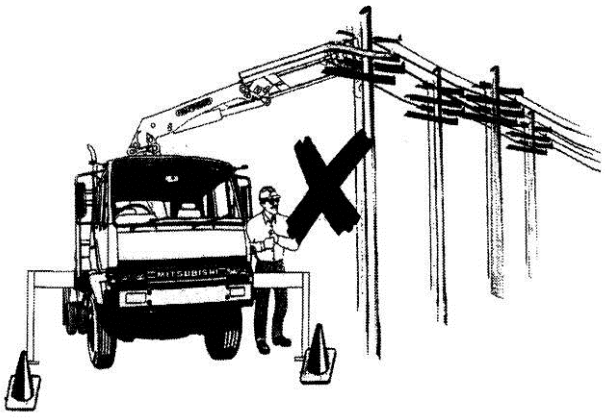


FIGURE 6.19.3 CLEARANCES FROM LIVE AERIAL CONDUCTORS

Safe work distances from power lines vary depending on the voltage carried by the line. In Queensland the distances are in accordance with the **Code of Practice 'working near Live parts',** other Australian states and territories have **different legislation** and the distances may vary from Queensland.



<u>No go zone</u>

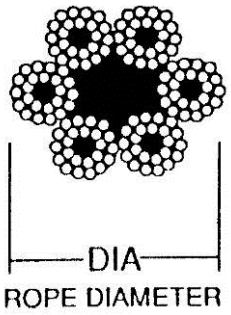
3 metres from distribution lines
and
8 metres from transmission lines.

<u>Spotter clearances</u>

6.4 metres from distribution lines
and
10 metres from transmission lines

FSWR

Flexible Steel Wire Rope



The properties of a wire rope are derived from its **diameter size, construction, quality, lay and type of core.**

The correct way to measure wire rope is shown below.

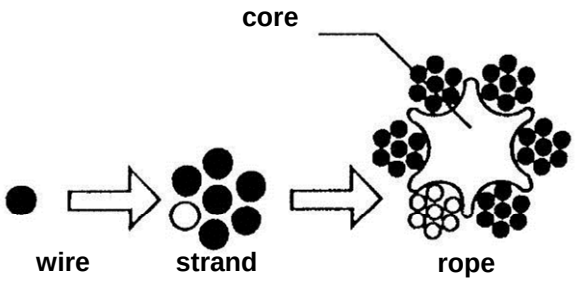
Selection

Proper selection of wire rope is all-important. Every wire rope design is planned to resist a given type of destruction. For instance, a rope made of a small number of heavy wires in the strands better withstands abrasion but more quickly fails from bending.

The rope made of many small wires better resists bending but more quickly falls victim to core abrasion. Longest rope service results from the correct compromise of resistance characteristics to meet the destructive forces as they are present in the particular rope use.

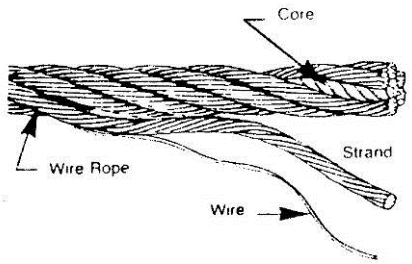
Construction

In this example each individual wire is arranged around a central wire to form a 7-wire strand. Six of these strands are formed around a central core to make a wire rope. The rope is specified as 6x7, i.e., six strands each of seven wires.



The Main Components Of A Wire Rope

Wire rope is usually made up of a number of wires laid left handed into a strand, then a number of strands, usually six, laid right handed around a hemp rope centre to form a wire rope. This makes what is called a "right hand ordinary lay" rope.



Right Hand Ordinary Lay Rope

Lay

If the wires are laid right hand and the strands left handed the rope is called" left hand ordinary (or regular) lay". When both the wires in the strands and the strands also are laid right hand, the rope is called "right-handed Lang's lay.

Measurement of Ropes Lay Length

Lang's lay rope must at all times have the end of the rope whipped to prevent unlaying.

Left Hand Ordinary Lay (LHOL)

The disposition of the outer wires in Lang's lay rope exposes a greater length of wire to wear, but Lang's lay is less stable than "ordinary" Lay and has a natural tendency to relax the lay and "throw out turns".

Right Hand Langs Lay (RHLL)

Care of Ropes and Slings

You can predict the life of wire rope in a general way on the basis of experience, but so many different factors contribute to wear and failure that you just can't depend on estimated length of life. Unusual stresses and damage including environmental stress sometimes makes a wire rope unserviceable when it's quite new. You can detect this

condition only by frequent and careful inspection. To determine what amount of wear or damage is dangerous, you'll need experience, and you'll have to know how the rope is to be used and what might happen if it should break.

General Inspection

- Ascertain the construction of the rope if not recorded; this is best done by counting the wires in one strand at the 'bare' end at anchorage.
- Broken wires ("needles" or "splinters"). 10% of the total number of wires in all strands in a length equal to eight diameters of the rope. e.g. 6 x 24 equals 144 wires in total. 10% of the 144 = 14.4 which in turn would equal 14 wires.
- **Wear on the outside wires** - each individual wire in a flexible steel rope when new is a complete circle in cross section. Wear, due to friction on sheaves, rollers, drums, etc, eventually causes the outer wires to become flat on the outside, reducing the circle to a segment which gradually becomes smaller as the "flat" increases. This wear should never be allowed to exceed 33 per cent of wires which is generally the result of the wear reaching a stage that when bending the rope around a sheave the wire finally breaks.

One broken wire below a metalled socket is sufficient to cause rejection as this is evidence of serious fatigue in the rope immediately below the socket.

- **Corrosion** - examine carefully and where socketed, inspect near socket.
- **High stranding** - usually due to faulty whipping of bare ends of rope when cutting. One or more strands slip around the lay and project above the surface. Excessive wear and crushing take place and the other strands become overloaded.
- **Bird caging** - usually found in Lang's lay rope; faulty whipping of bare ends causes strands to slip from the proper tight lay, consequently strands open up, also caused by end of rope being allowed to rotate with like result.
- **Splices** - examine closely for damage, tucks, drawing out, corrosion, faulty service, etc. A splice should never at any time be allowed to pass into a sheave or around a sharp object or corner when slinging. It should never remain in the 'nip" of a reeved sling or be heaved out from under or through any object.
- **Turns** - in cranes, hoists, derricks, etc., having multiple falls of other than non-rotating ropes the rope when new will stretch and unlay slightly causing turns to appear in the load block, these must be removed.
- **Sudden loads and shocks** - shock loads can increase the loads in FSWR by up to 20% of the weight on the wire where there is any evidence of this be very careful with inspection and watch anchorages, thimbles, etc.

- **Kinks** - usually caused by faulty handling or reeving strands become "dog – legged" and where running on sheaves are subject to excessive wear at the kink.
- **Crushed or jammed strands** - dangerous due to deformation of wires.

Safe Working Loads on Steel Wire Ropes

The SWL on FSWR is based on a percentage of the breaking load. Safe working loads for the various uses to which the wire rope may be put are as follows:

(NB: Referred to as the "Factor of Safety")

1) Safe Working Load = 1/5 of the breaking load.

To be applied to ropes used on the following;

Hand cranes, conveyors, engine house cranes, cranes for occasional use only, single and twin derrick poles, bucket conveyors, slings, yokes and general lifting gear used in medium factories and workshops or wharves for moderate light duty work. In general this classification includes cranes and hoists in commission not more than two thousand five hundred hours per annum and not commonly engaged in shift work or for such arduous duties as are customary in heavy industries.

2) Safe Working Load = 1/6 of the breaking load.

Cranes, hoists, slings, lifts, yokes and general lifting gear used in heavy industries and generally in commission more than two thousand five hundred hours per annum (i.e. heavy duty Work).

3) Safe Working Load = 1/10 of the breaking load.

To be applied to ropes used on passenger and goods lifts and generally where persons are being lifted.

4) Safe Working Load = ¼ of the breaking load.

To be applied to ropes used for stack and tower guys and suspension bridge ropes.

NOTE: the "Factor of Safety" is the difference between the Guaranteed Breaking Strain (G.B.S.) and the Safe Working Load (S.W.L) of the F.S.W.R.

Rule of Thumb Methods of Calculating The S.W.Ls of Flexible Steel Wire Rope.

Please note that these methods only give approximate answers based on factor of safety of 5.6 to 1.

Flexible Steel Wire Rope (FSWR).

To calculate the SWL in kilograms of FSWR square the rope diameter (D) in millimetres (mm) and multiply by 8.

Formula D2(MM) X 8 = SWL (KGS)

For example: Rope diameter (D) = 12mm

D^2mm x 8 = SWL in KG

Dmm x Dmm x 8

12 x 12 x 8 = 1152 KG

∴SWL in tonnes = 1.15 tonnes

Inspection and Discard

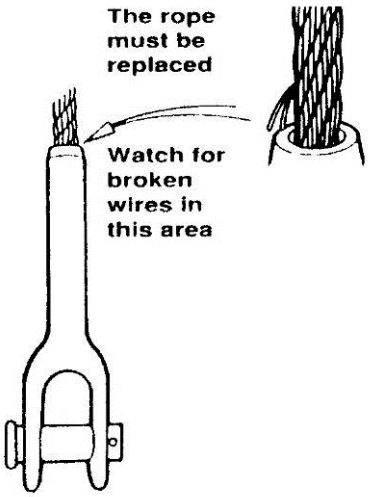
It is important to check all rope for wear and damage before use. Rope can deteriorate due to several factors.

These factors include abrasion, fatigue, corrosion, stretching (from overloading and shock loading) and mechanical damage.

When inspecting:

- observe the construction and lay of the rope;
- check for signs of stretching;
- check the whole rope for broken wires; Note: where broken wires are present count the number of broken wires in the length of rope eight times the rope diameter. The total number of broken wires must not exceed 10% of the total wires.
- 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. Check the valleys between the wires for corrosion beneath the surface;
- kinks, knots or fractures from bending or reeving;
- crushed or jammed strands;
- birdcaging. Faulty whipping of bare ends allows the strands to loosen from their proper tight lay. It can be caused by rotation of the end of a rope or a sudden release from high loading; and
- high stranding. Where a strand has slipped around the lay and projects above the surface due to faulty whipping and cutting of the rope ends.

Check splices for damage, tucks, corrosion and drawing out. Never allow a splice to pass around a sharp object, remain in the ‘nip’ of a reeved sling or be pulled roughly from under or through an object.
Check the swaged splices for fatigue, corrosion, wear and broken wires where the rope enters a splice.



When Using FSWR

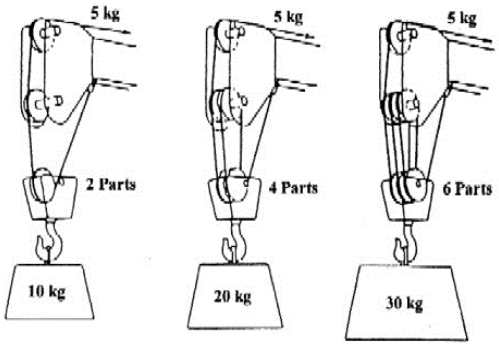
- FSWR of 6 x 19 1570 MPA is the minimum construction to be used for lifting.
- Do not lift with wire rope less than 6mm diameter.
- Do not use a rope that should be discarded.
- Do not use Lang's lay unless the ends are fixed to prevent the rope unlaying.
- Do not allow kinks or knots to develop.
- Do NOT expose FSWR to temperatures above 95^0C.

Minimum FSWR Sizes Required to Tie Winches

Hoist SWL up to 500 KG – 9mm
Hoist SWL over 500 KG – 12mm

WINCHES, SHEAVES AND PURCHASES FOR FLEXIBLE STEEL WIRE ROPE

Sheaves



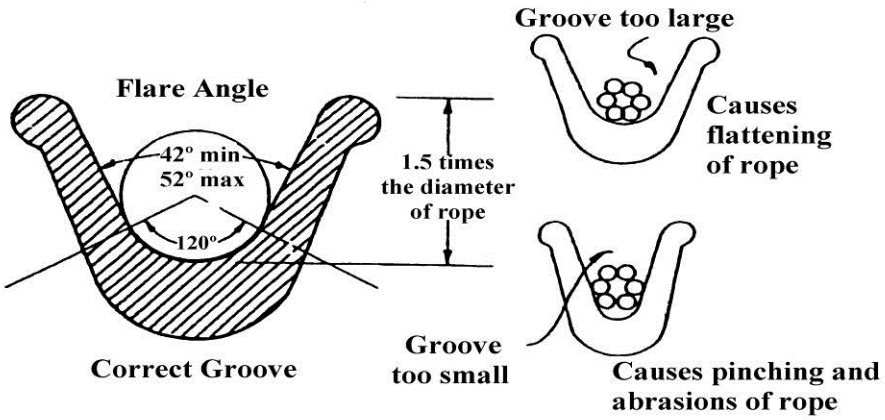
Sheaves lead the rope over the head of cranes and hoists and are used in pulley systems to gain a mechanical advantage.

THE REASON FOR MULTIPLE PARTS OF LINE

Flare angle and groove depth

The grooves should be slightly larger than the nominal diameter of the rope. Grooves which are too large will flatten the rope, grooves too small will pinch the rope and extra friction can cut it to pieces.

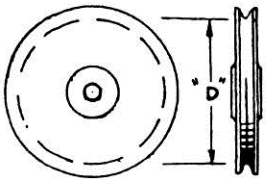
Sheaves should have a smooth finish with flared edges which are rounded-off



Sheave diameters

The table below gives sheave diameters and safety factors for types of work.

Duty	Classification	Type of Work	Ratio to rope diameter			Safety factor	
			Drum	Sheave	Equaliser Sheave	Reeved	Other
Light duty	M1	Manual lifting with a chain block or 'one off' installations	11.2	12.5	11.2	3.15	2.5
Medium duty	M5	Normal use such as operation of a mobile crane	18.0	20.0	14.0	4.5	4.0
Heavy duty	M8	Continuous operation such as EOHT crane in steel prod. or a tower crane on building site.	25.0	28.0	18.0	9.0	5.0

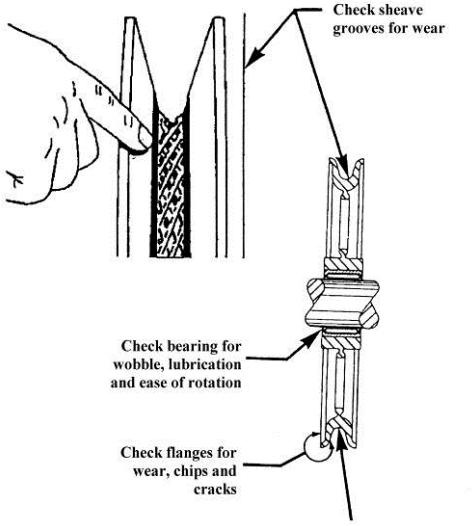


Caution. Modern cranes and hoists are complex pieces of engineering equipment, and may have special construction luff and hoist ropes. It is essential that the sheaves which were designed for a particular crane or hoist are used for that purpose.

It is also essential that when a rope is replaced, the replacement is the same diameter and construction as the old rope. The sheave system must be thoroughly checked to ensure that any damaged or worn grooves likely to ruin the new rope are repaired or replaced.

NOTE:
As a general rule the diameter of the sheave is approximately twenty times the diameter of the rope.

Sheaves should be inspected regularly, pay particular attention to the sheave groove and flange, any cracks or chips on the flange can cut the rope as it lays into the groove.



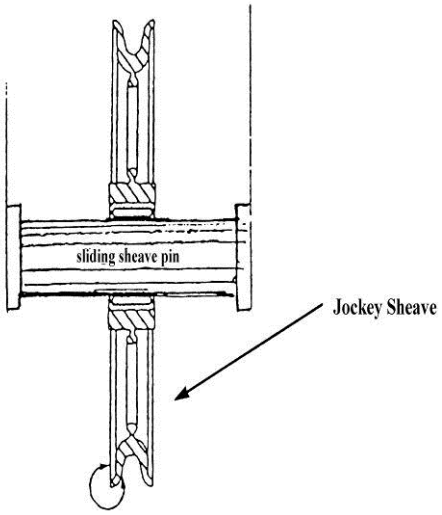
The groove should be checked for wear that will result in the reduction of the groove diameter and give an uneven bearing surface for the rope.

All Sheaves should be checked for **lubrication, badly lubricated sheaves cause extra friction** in the system and wear on the sheave pin and bearing.

The pin should be prevented from rotating with the sheave. Some sheave pins only have a small cotter pin which fits into a recess on the cheek plate, the cotter pin sometimes shears and allows the pin to turn with the sheave, rotating pins are dangerous as they turn and can cut through the cheek plate.

Jockey sheaves

A jockey sheave is sometimes used as the first diverting sheave to reduce the fleet angle. This sheave fits on an extended pin to allow it to slip from side to side reducing the fleet angle. The jockey sheave pin should be kept well greased and free from grit and dirt to allow the sheave to slide across the pin.



Drums

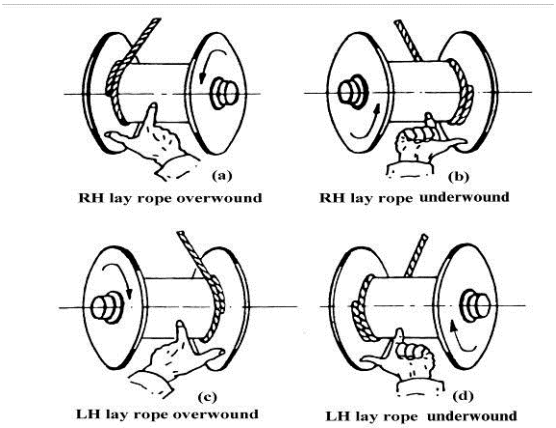
Drums are the pulling mechanism which rotates, hauls in and stores surplus wire. The braking mechanism is connected to either the drum or the gearing which is joined to the drive mechanism. Drums are measured from the centre of the inside of the flange. A drum which measures 1m from flange to flange is therefore a 0.5m drum.

Anchorage of Wire Rope on a Winding Drum

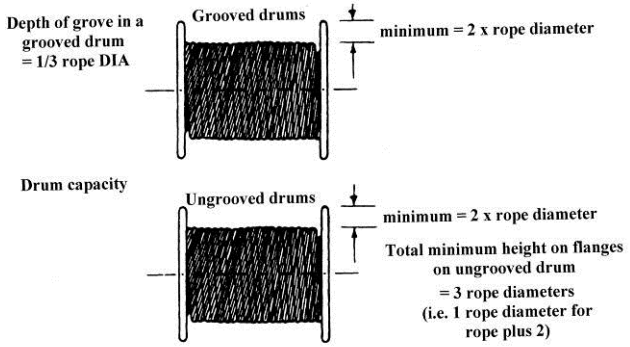
A wire rope will always tend to roll or unlay itself in a direction opposite to that in which it is laid up. Attention to this point will prevent much of the cross lapping abuse where ropes rest on flat bottomed drums.

If ropes are anchored as shown in diagram (on page 25) each consecutive turn of rope on the first layer will roll towards its neighbour tending to produce a tight uniformly wound first layer, this produces a sound foundation which will facilitate uniform winding of subsequent layer.

If the rope anchorage is located on the wrong side of the drum the rope turns will tend to jump away from one another leaving gaps into which subsequent layers of rope will drop and pinch, leading to unnecessary abrasion and squashing of the rope as well as impact loading when pinched turns release themselves with a jerk.



The correct side of a drum at which to anchor a rope can be readily checked by using the convenient thumb rule. The right hand should be used for Right Hand Laid ropes, and the Left Hand for Left Hand Laid ropes. The wire rope is represented by the forefinger while the clenched hand with the back up represents an overwound drum, and with the palm up an under wound drum, the thumb of the hand then points to the flange or side of the drum at which the rope should be anchored.



The rope should lay neatly on the drum and not be bunched up. There should be a minimum of two full turns on the drum when the hoist is at the lowest level.

The rope must be anchored to the drum with a fixed mechanical anchorage, be aware of the danger of not properly tightening an anchorage, do not rely on the frictional grip relayed by the two turns on the drum.

Comply with the hoist manufacturer's recommendation about whether drums are overwound or underwound. If a drum is wound up incorrectly it can affect the anchorage, brake and drive mechanism to the drum, resulting in mechanical failure.

Operators should ensure that the hoist brake is adjusted to take the extra torque when the load is raised to its maximum height. A brake which holds the load near the ground may fail when the load is high.

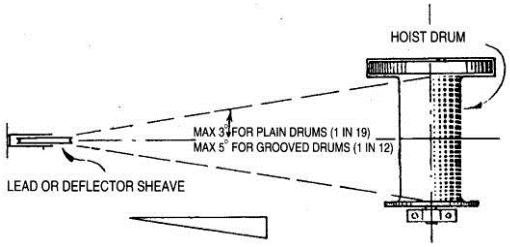
The top layers on a multi-layered drum must not be closer than two rope diameters to the top of the flange when the drum is full.

Fleet Angles

The maximum fleet angle is measured from the centre of the drum to the centre of the first diverting sheave then back to the inside flange at the middle of the drum.

The maximum fleet angle for a grooved drum is 5° and for an ungrooved drum is 3°. To achieve these angles the distance form the drum to the first diverting sheave must be a minimum of:

- 19 times half the width of the drum for an ungrooved drum; and
- 12 times half the width of a grooved drum.



Formula for Fleet angle = Width of Drum x 0.5 X Fleet (19 or 12)

Example 1:

Width of grooved drum = 1 metre
12 x 1 x 0.5 = 6, therefore the sheave must be 6 metres from the drum.

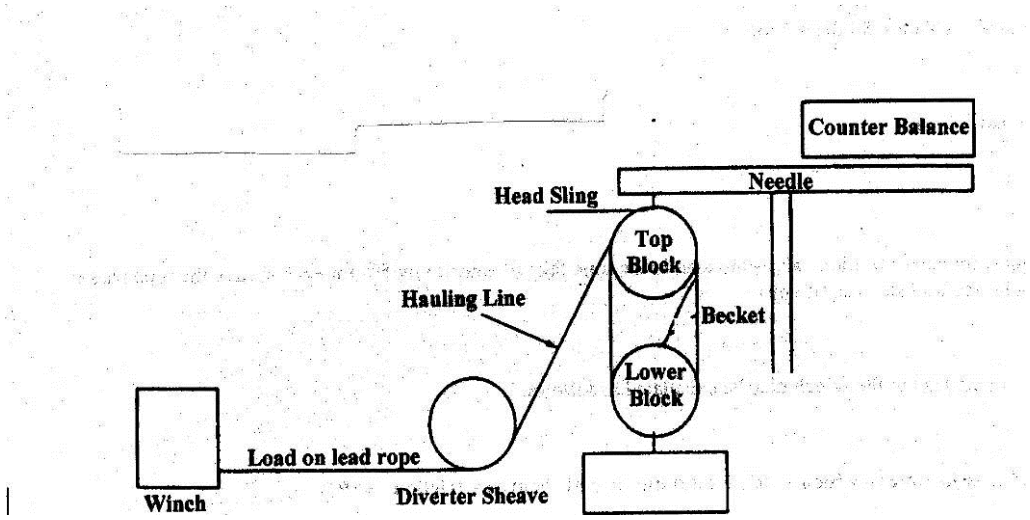
Example 2:

Width of the ungrooved drum = 1 metre
19 x 1 x 0.5 = 9.5, therefore the sheave must be 9.5 metres from the drum.

TERMINOLOGY ON WINCH OR PULLEY SYSTEMS

COUNTERBALANCE	Suitable weight required to anchor inboard end of cantilever needle
CANTILEVER NEEDLE	Timber beam to project anchorage point for block and tackle system from building or structure.
HEAD SLING	Wire sling to attach top block to needle.
BLOCK	One or more revolving sheaves encased in a house fitted with either a hook or eye for securing wire sling.
SHEAVE	Revolving grooved wheel to enable hauling line to pass through block with minimal friction loss.
TOP BLOCK	Fixed block attached to needle or beam.
LOWER BLOCK	The travelling block fitted with a hook or eye to attach the load to be lifted.
BECKET	Anchorage point on block to which terminal end of hauling line is attached.
BECKET LOAD	Load which is applied on becket point of block which varies with load and number of sheaves.
DIVERTER SHEAVE	Single sheave used to divert purchase required from a vertical to a horizontal plane.
HAULING LINE	Manila or wire rope which is used to reeve blocks. Purchase end also becomes lead rope.
LOAD ON LEAD ROPE	Load or purchase required to move load.
FRICTION	Effort lost by reeving rope through sheaves. (Usually 5% loss per sheave).
FLEET ANGLE	Minimum distance required from diverter sheave to winch.
MECHANICAL ADVANTAGE	Purchase gained by reaving rope through a series of sheaves.
WINCH	Hand, air, electric etc.
TACKLES	Refers to fibre and synthetic rope systems only. FSWR must not be used with tackle blocks (ie. Tackle block is a fibre rope block).
PURCHASES	Referred to FSWR systems and is much stronger and larger in design (ie. Purchase block is a FSWR block.

Typical Block And Tackle Or Purchase Arrangement Major Components



HOW TO WORK OUT THE LOAD IN A SINGLE PART OF A PURCHASE

The greatest load on any rope in a purchase is the load in the lead rope to the winch. This is due to the friction between the rope in the groove of the sheave and sheave pin. Friction is estimated at about 5% per sheave (ie. One twentieth of the rope load that would occur if there was no friction).

The effects of friction, acceleration or deceleration are not usually included when dealing with work of a temporary nature unless a number of falls are used or unless the rope velocity is high, (ie. 0.6m sec).

When a load is at rest suspended from the lower block, the becket load (the load is each part of the rope purchase) is found as follows.

Becket load = Total Load on Lower block ÷ No. of falls of rope supporting load.

Note:
The total load on the lower block includes the load to be lifted plus packings, slings, shackles, blocks etc;

For example: (excluding frictional effects)

Total load on the lower block = 10t including gear;

Number of falls of rope = 5 supporting the moving block;

Formula:

BL = Load ÷ Falls

Becket load = 10 ton ÷ 5 falls = 2 tonne

As lifting commences friction causes the load in the rope falls to increase by 5% for each sheave the rope passes over, including lead sheaves (if any).

The load in the lead to the winch may be calculated as follows:

The load in lead rope to winch **= BL x total number of sheaves in purchase x friction + BL**

For example: Becket Load is 2 tonne

No. of sheaves in purchase = 5(3 top block + 2 bottom block)

Number of lead blocks = 2 (7 sheaves in total)

Load in lead rope = **BL x Total Number of Sheaves in purchase x friction + BL**

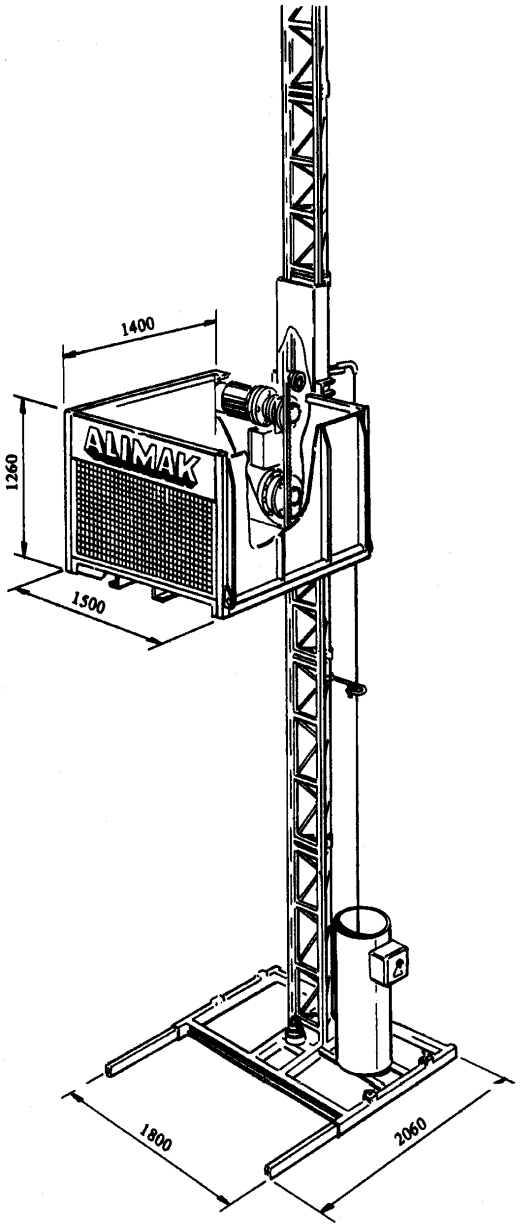
= 2 x 7 x 0.05 + 2 = 2.7 tonnes

The above calculation does not allow for sudden impact, acceleration and deceleration the can cause very high loads in the rope, these should be avoided.

Technical Data

CAPACITY	
Pay-load capacity	500 kg
Erection load	500 kg
Speed 50/60 Hz	26/31 m/min.
Max. lifting height	100 m
Erection crane capacity	50 kg
Safety device	type GF
CAGE DIMENSIONS	
Internal width x length	1.4 x 1.5 m
ELECTRICAL DATA	
Power supply range	380 – 480 V 50 or 60 Hz, 3-Phase
At 380 V/50 Hz:	
Power supply fuses	16 Amp.
Rated power cont. duty	1 x 4 kW
Rated power 15 % int. duty	1 x 6 kW
Starting current	59 A
Power consumption	8 kVA
Data at other voltages on request	
WEIGHTS	
Base unit weight incl. enclosure	900 kg
Base unit weight excl. enclosure	750 kg
Mast section	46 kg
Mast section length	1508 mm

Optional Equipment: Ground Enclosure
Landing Equipment
Transport Equipment



THE CANTILEVERED PLATFORM (ONE OR TWO BARROW) MATERIALS HOIST

Cantilevered platform (materials only) hoists run up and down the outside of the hoist tower. They are designed for the erection of small multi-story buildings.

The working height of the platform is 30 metres or less.

Under no circumstances can these hoists be used to carry passengers. Only certificated personnel carrying out erection, dismantling or maintenance can ride on the platforms of a materials only hoist.

Hoists must be set up by certificated personnel. Hoist operators should know all the set up specifications given below, this will enable you to check that the hoist is safe to operate.

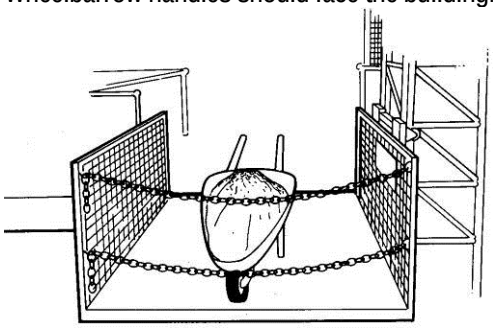
Safe Working Load

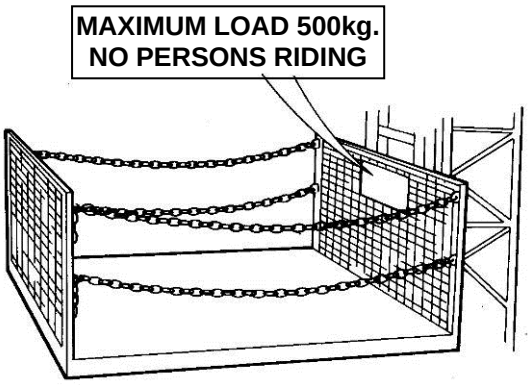
The safe working load (S.W.L.) must be displayed on the platform. The hoist SWL will be either single barrow 250 kg or a double barrow 500kg. Do not allow the load to exceed the SWL.

Typical Loads

A wheelbarrow of concrete weights up to 250kg. A wheelbarrow of bricks weights up to 216kg. (45 bricks) a pallet load of bricks weights up to 2 tonne.

Wheelbarrow handles should face the building.





Safe Operation

Pre-Checks

The Tower

Make sure that the hoist ties are in place and that the tower has secure foundations and comply with both manufacturers and engineers specifications for the site.

Check that the Tower is Vertical

The Hoist Wire

The hoist wire must lie neatly on the drum and comply with all requirements in the wire section.

- Check the sheaves are greased and that they turn freely; and
- Check that there is a cam or gripper system installed.

NOTE: A cam gripper system must be installed to stop the platform from falling in the event of a rope failure.

The Tower Guides

The tower guides must be clean and rust free.

Signs

Make sure that the “SWL” and the “NO PERSONS RIDING” signs are in place and readable.

Platform Barrier

Make sure that the attachment points for the barrier are not bent or damaged.

Brakes

Raise and then lower the platform a couple of times to make sure that the brakes work.

All Operational Limits

Are in place and in working order.

Solid Base

The hoist must not be setup over a trench or excavation. When setting up near a trench the distance between the base of the tower and the edge of the trench must be greater than the depth of the trench.

The hoist must not be set up on loose material, bricks or unstable ground. It must be set up on solid timber packing. Where outriggers and screw jacks are fitted they must be tightened to maintain the hoist in a vertical position.

Never set up over underground services. Approval has to be obtained from the relevant authority.

Protective Barriers

The handrail must be made of scaffold tube and fittings or other material with equal strength. The uprights must be at least
1 metre high and the handrail should be securely attached to the upright.

At the base of the tower the handrail must be set back at least 800mm from the platform to stop people from leaning over and being hit by the platform coming down.
There must be an effective gate in the handrail such as a moveable or sliding rail to allow access to the platform.

Protection must be provided to each floor the hoist is to service, in the way of gates and meshing. The hoist must not be set up in front of any access way to a building unless it is blocked off.

The gap between the platform and building floor must be secured and made of solid timber or metal. **The gap must be no less than 25mm and no more than 100mm. 150mm is allowable if a drop down hinged flap is used.** Do not use loose bridging plates.

If the hoist goes past any window or opening in the building, the opening must be blocked off to prevent people leaning out and being struck by the platform.

There must be effective overhead protection, by means of an overhead guard for the protection of the driver.

Containment must be to the standard set out in legislation and of adequate strength to contain the maximum load, plus prevent any material falling.

Securely Tied

The tower must be guyed or tied every 6 metres with no more than 3 metres free standing above the top tie, irrespective of the working height of the platform.

A top limit switch must be installed to stop the platform approaching closer than 1.5metres to the head sheave on the tower.

When the tower can not be tied directly to the building or structure guy ropes can be used only if manufacture’s specs allow.

The guys must extend diagonally from the 4 corners of the tower and the platform must not foul any guy rope.

Guy ropes must be at least the same strength as the guys and rigid enough to stop the tower flexing.

Fibre rope guys must not be used.

Electrical

Power Source.

Make sure that the lead from the power source is secured well clear of the ground and is in good order. For further information refer to the legislation in relation to electrical practices for construction work.

The power supply used for the hoist must be protected with an earth leakage (residual current) device which prevents electric shock should there be an electrical fault.

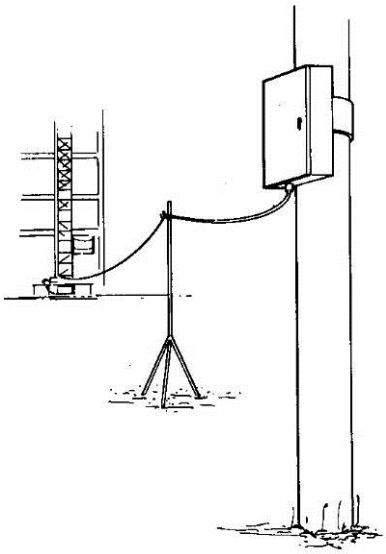
If the electrical power lead from the main box is loose it must be tied up clear of the ground, (minimum 2m). There have been many serious and fatal accidents because of leads lying on wet ground becoming entangled in, or severed by, equipment.

Never attach a power lead to metal scaffolding. Should the lead be severed the entire scaffold could become live endangering all personnel on the scaffold.

Hoist drivers must not replace blown fuses. Call an electrician.

All electrical equipment must be protected against water. If you find the power lead lying on the ground in a puddle of water, cease work immediately, report the situation to the relevant personnel and take corrective action.

You must know the location of the main switch.



Operation

- Make sure that the hoist platform is always the correct distance from the landing and that bridging pieces are never used;

- Wheelbarrows should be wheeled onto the platform with the handles facing towards the building, this is so that the worker on the floor above will not have to climb over the barrow to wheel it off;
- **If there is a possibility of damage or interference from other equipment on site. Stop work immediately, report the situation to the appropriate personnel so corrective action can be taken.**
- The load height must be no more than 1 metre above the handrail;
- If the power is switched off during operation find out why before resuming operation;
- Always stop the hoist platform level with the landing platform;
- Do not raise or lower people on the platform;
- Do not overload the hoist;
- Do not move the platform if the red light is showing (where fitted);
- Do not raise the platform unless the barrier is in place;
- Do not leave the hoist driving station when the platform is off the ground;
- Do not allow a load to overhang a platform.
- **If any abnormal noise is heard during operation, stop work immediately. Check all moving parts of the hoist**
- **(electric motor, sheaves, hydraulic pump, hoist brakes, guides etc) and report the incident to the relevant personnel.**

Warning Lights and Bells

For buildings more than 3 floors in height, all materials hoists (cantilevered platform and tower) must have warning lights and bell system. Gates must be connected to a limit switch as well as warning lights.

There must be 2 red lights and 1 green light wired to the gate:

- Gate Open – Red Lights On; and
-
- Gate Closed – Green Light on

Do not under any circumstances move the platform when the red lights are showing. There are two red lights so that if one fuses one will still show. If only one red light is showing arrange for maintenance.

Lights must be connected to the main supply and transformed down to 32 volts. Batteries must not be used. A bell signalling system may be used for signalling the operator from the other floors.

The Signals are:

1 Bell stop
- 2 Bells hoist up
- 3 Bells lower
- 4 Bells accident

Signals may be given by:

- whistle;
- bell;
- radio;
- hand signals; or
- lights

Note: All signaling systems must be tested daily for correct operation to ensure the signals are received at the driver's station.

If the communication system is defective, cease work immediately, assess the situation and report to the authorised person.

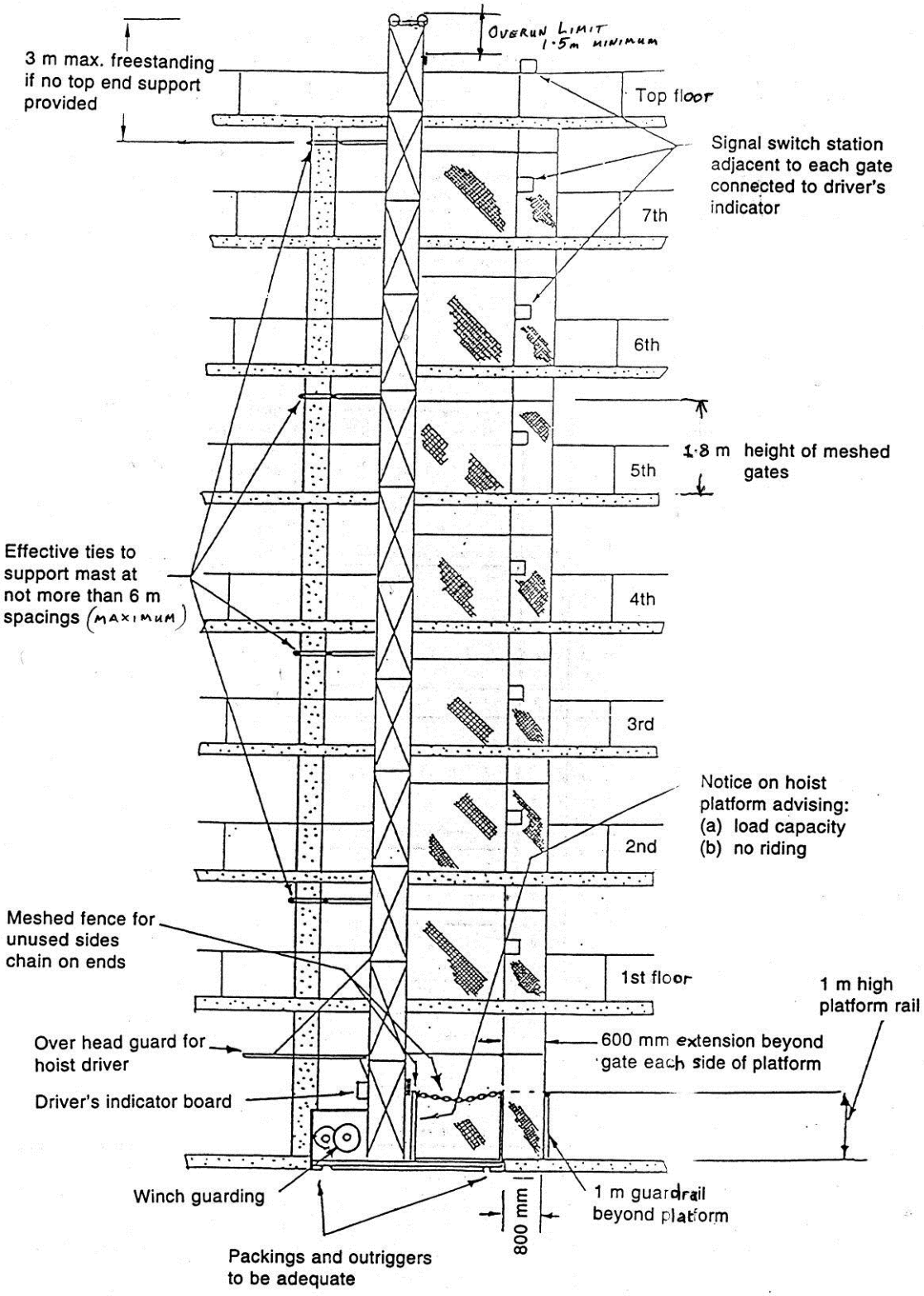
Shut Down

- lower the platform to the ground;
- switch off the power at the driving station;
- switch off the power at the mains;
- unplug the main electrical lead to the winch at both ends and lock the isolation switch; and
- lock up the main electrical lead.

You have an obligation under the WPH&S Act to ensure the hoist is left in a safe manner and to secure the hoist against unauthorised use.

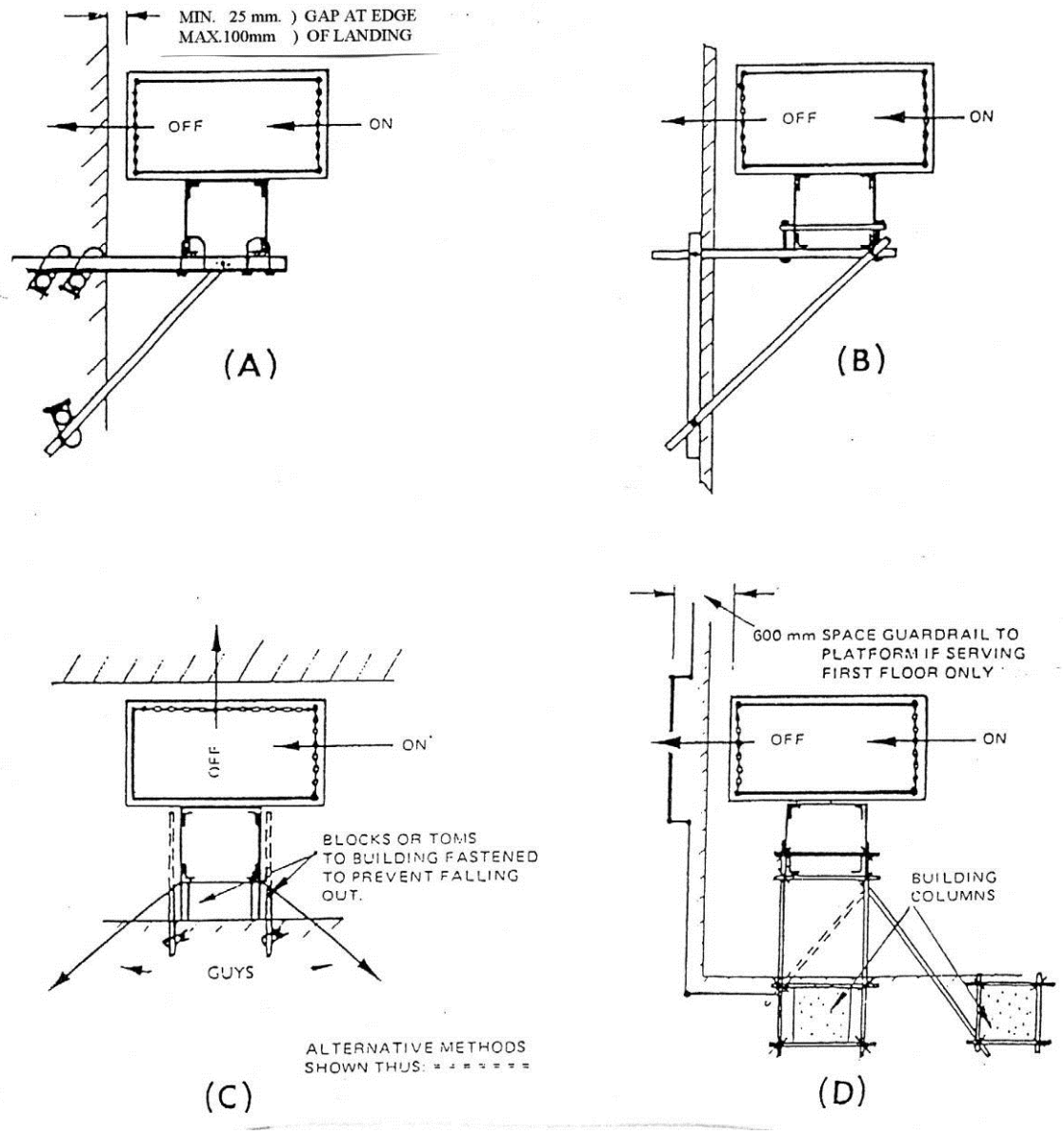
It is important that the hoist is stowed and secured correctly to prevent use by unauthorised personnel.

CANTILEVER BUILDERS' HOIST

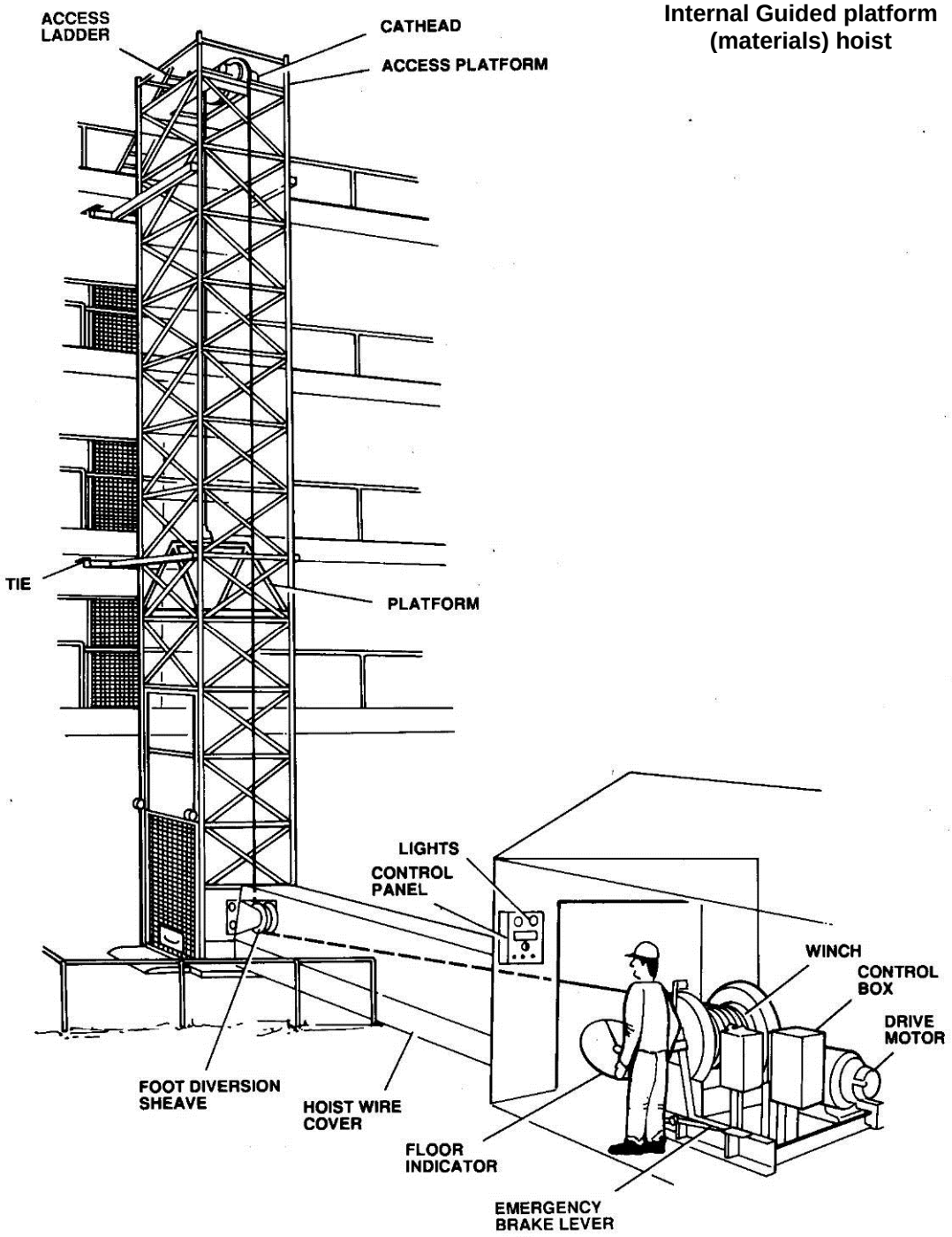


Plan Methods Supporting Hoist Towers Direct to Buildings

Armstrong Material Only Hoist



Internal Guided Platform



Internal Guided platform (materials) hoist

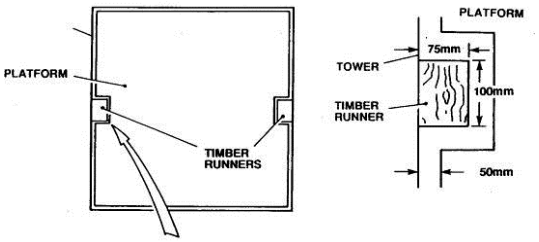
The Internal Guided Platform (Materials) Hoist

Tower Set-Up

The tower must be erected by certificated personnel strictly in accordance with manufacturer's specifications.

It must be tied to the building or guyed to the ground every 9 meters. There must be no more than 6 meters free standing between the top guy or tie and the top of the tower.

Guys must extend from the corners of the towers. They must a minimum of be 12mm in diameter and 6 x 19 construction FSWR. **Fibre rope must not be used.**



Timber runners and dimensions

Tower Hoist

Safe Operation

The pre-checks, post checks and safe operation procedures described below apply to both super duty tower hoists and internal guided platform (materials only) hoists.

Pre-Checks

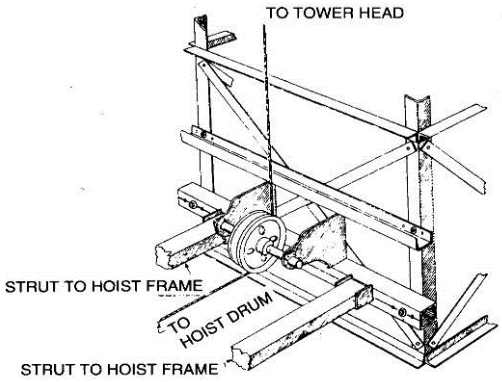
The Tower

The hoist ties must be in good order and the tower secure.

Hoist Wire

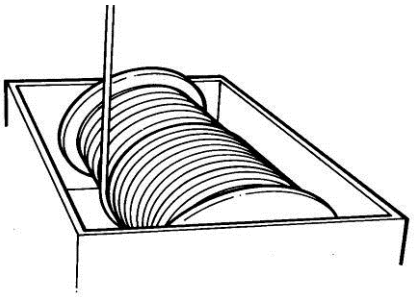
Check the hoist drum and wire for defects as per wire rope section.

Make sure that there are no obstructions to the free running of the hoist wire over the winch drum and through the foot diversion sheave. Make sure that there are no materials left in the area between the winch drum and the foot diversion sheave. Safety signs must all be in place. Check the main switch for danger tags.



Foot diversion sheave

The hoist wire must not show loose turns on the drum and have a minimum of two full turns when the hoist is at its lowest level.



Make sure the winch anchorages are secure. Alternatively check the counterweights on the winch. If the winch has moved, the fleet angle will have changed.

A floor indicator must be installed where the platform travels more than 6 floors or 15 metres or if the driver's view is obstructed.

Operation

Do not carry passengers on a materials only tower hoist other than certificated personnel carrying out maintenance.

Do Not Overload a Hoist:

The SWL must not be exceeded.

If the fork lift truck carries a load onto the hoist remember to add the weight of the fork lift to the weight of the load.
Make sure that any heavy load is placed in the centre of the platform or evenly distributed. The platform must always be brought level with the loading platform.

Combined with the weight of a forklift truck a pallet of bricks is too heavy for any material only hoist. Always check the combined weight.

The combined weight of the load and the platform for standard internal guided platform tower hoists must not exceed 1 tonne. (refer to manufacturers written specification for guidance regarding specific loads the hoist you operate is actually designed for).

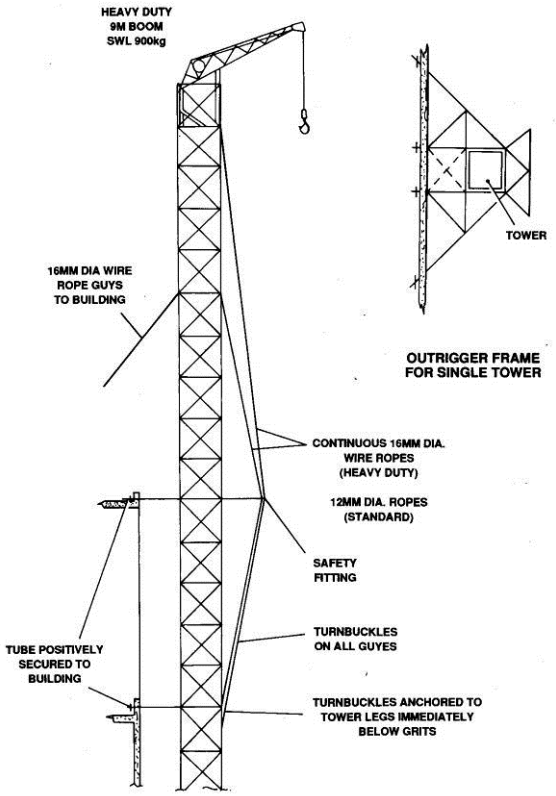
Using a Jib Attachment

The platform must be on the ground when using a jib to raise a load. Do not drag or snig a load with a jib. Do not raise bulky or light loads with a jib in windy conditions. Maximum wind speed is 15m.sec (54kph – 33mph) unless specified in writing by manufacturer or regulatory authority.

Slinging and directing of loads must be carried out by certificated dogman. Do not raise loads on a jib close to electric power lines.

Use dry natural fibre rope handlines to control loads near power lines with a minimum of 16mm diameter.

Hoist Tower Secured by Ties, Guys and Bowstrings



Elevation Showing Bowstrings and Outriggers

Post Checks

- Bring the platform down to the lowest position;
- lock on the manual safety brake;
- close all the gates;
- check that all the green lights are on;
- switch off the power to the hoist at the driving station;
- switch off the power at the main switch; and

- when a jib has been used make sure that the jib wire is hoisted up to the maximum height, the jib must be left so that it can spin freely in windy conditions.

Super Duty Tower Hoists

Super duty tower hoists meet the need for a hoist with a greater load carrying capacity. Super duty hoist towers can be erected to a height of 150 metres. Some have dual towers. Dual towers can be erected so that there is a concrete tipping bucket in one tower and a platform in the other.

Tower Set Up

Towers must be fully braced against the building. Towers must not exceed 75 metres where guy ropes only are used. Towers more than 75 metres must be braced every 16 metres starting from the base. Towers of 75 metres or less must be guyed from each corner with 16mm diameter, 6 x 19 FSWR every 16 metres.

A tower must not project more than 18 metres above the top of the building, the projecting section of tower must be guyed in all directions.

Tube 89mm diameter x 4.88mm thick must be used for towers up to 107 metres in height above 107 metres the lower section must be constructed of 89mm diameter x 5.9mm thick tube.

The tower structure must be of 2 metre high panels, 2.4 metres x 1.9 metres. Dual towers are 4.9 metres x 1.9 metres.

The section of the lower tower where the foot diversion sheave is attached must be 89mm OD hydraulic tube, it is usually painted yellow and branded FS.

Hoisting System

The hoist wire for a super duty hoist must be 20mm ordinary lay and at least 1570 grade FSWR.

Protective Barriers

The same requirements as for the standard tower hoist.

Warning Lights

The warning light system is the same as for other types of materials hoists. There must be a level indicator at the driving station where the platform rises to 15 metres or 6 floors above the driving station. Hoists operating with jibs or buckets only do not need a level indicator.

Jib

Where long loads have to be hoisted a jib attachment can be fitted to a tower. Jibs for tower hoists are 9 metres long with a fixed radius of 6.4 metres. The jib slewing motion is controlled by the handline.

Do not use the jib when there is a load on the platform or bucket or when the platform is off the ground.

Do not use a jib to drag or snig loads.

Single Tower (2.4m X 1.9m)

A single tower super duty tower hoist can raise 2.5 tonnes up to 150 metres.

The platform weights 600 kg;

Therefore the lifting capacity = 1.9 tonnes. i.e. (2,500kg – 600kg = 1,900kg).

Dual Tower (9.4m X 1.9m)

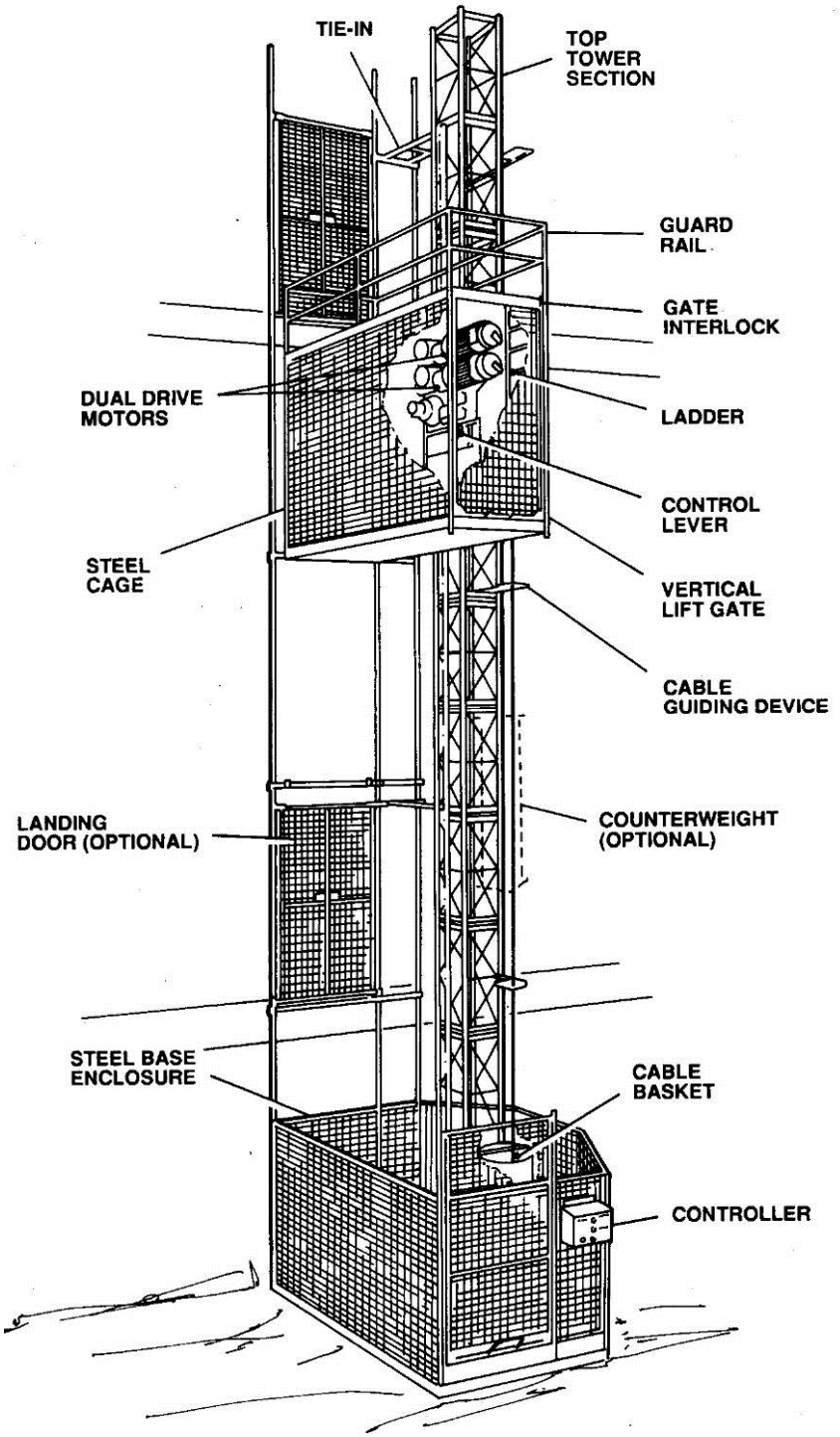
Where both towers of a dual tower hoist are in use the SWL of each is 1.2 tonnes. (1200kg).

The following SWLs also apply to dual tower hoists.

- SWL of a 0.75 cu m bucket weighing 320 kg is a load weighing 880kg (total 1200kg);
- SWL of a 0.38 cu m bucket weighing 260kg is a load weighing 940kg (total 1200kg); and
- SWL of a platform weighting 600kg is a load weighing 600kg, (total 1200kg).

Alimak Hoist

Cantilevered platform personnel and materials hoist.



Cantilevered Platform (Personnel and Materials Hoist)

Safe Operation

Hoist operators must be able to identify faults in the hoist set up and operation.

Pre-Checks

Security

Check that nothing has been disturbed from the night before. The car should have been left at the bottom landing with the control isolated and locked, the car door closed and the landing gate closed and locked. **(if interference or tampering is suspected, report immediately to authorised personnel)**

Inspect

Check under the cage for rubbish or water. Rubbish will constitute a fire hazard and should be cleaned out on a regular basis. Water lying in the pit will prevent inspection of hold down bolts and will cause the bolts to rust. Check the position of shock absorber springs.

Platform

Check that the platform is at the bottom landing before unlocking the landing gate.

Weather

Do not operate the hoist in high winds especially if the wind velocity is more than 15m/sec (54kph – 33mph) unless otherwise specified in writing by the manufacturer or regulatory authority. **(strong winds could dislodge the power cable from the cable guides)** Water can adversely affect the operation of brakes. If it is raining raise and lower the platform twice to make sure the brakes are working properly.

Obstructions

Make sure that there are no obstructions such as pipes in the path of the hoist platform.

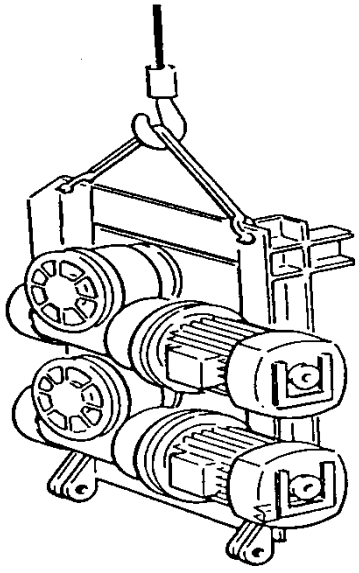
Be aware of form workers erecting formwork on upper levels. Ensure that protruding timbers are not placed in the path of the platform.

Check

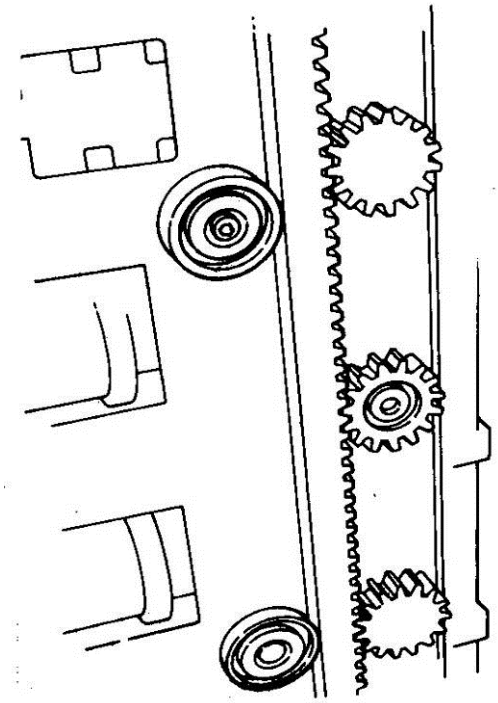
- The fire extinguisher, i.e. date has not expired, correct type for electricity and has not been discharged;
- check that the log books are in order and if any maintenance has been carried out since the last shift, this will alert you to any special checks that may be required;
- check tools for re-setting emergency brake are in place;
- check that the holding down bolts on the motor frame are secure;
- hoist motor frame is bolted to car and hooks around the tower uprights;

- failure to check security of holding bolts will allow motors to disengage from hoist rack and cause car to fall;
- climb to the roof and inspect the safety hooks, rollers for security and lubrication;
- look up and check ties and spacing. Tower sections are 1.5m high. Ties should be every 9m (6 towers); and
- check that the rack and pinion is well greased and that the “teeth” are in good order.
- Make sure that the lift car alarm and communication system is functioning.
- Check that there is nothing which can constitute an obstacle in the path of the hoist or the counterweight.

Note: **If you notice a tower frame connection bolt is loose, cease work immediately, report the fault to the authorised person and inspect all other bolts for correct tension.**



MOTORS



RACK AND PINION

Keep this under observation all the time.

Take the hoists on a test run to check;

- Brakes – up and down;
- Emergency stop;
- Test each motor brake for safe operation;
- The operation of the travel limits. show caution when approaching the top or bottom landing;
- **Testing emergency lowering device can only be attempted if recommended by the manufacturer (if testing an emergency lowering device do so with the hoist as low as possible and try to avoid tripping the lower limit device.)**
- All gates including the trap door for safe operation;
- **Report to the authorised person any defective control.**
- Make sure that the hoist will not operate while the trapdoor or any of the gates are open. **(all gates are inter-linked with an electrical circuit that switches off the hoist if any gate is open);**

Some hoists operate with a stop/go button on an electrical system while others operate with an up/down lever through a hydraulic system.

Push Button Control Operation

Switch the main ON-OFF switch to ON.
If the power is turned off during the day, check with the electrician before turning on.

Make sure that the SWL stamped on the load plate is not exceeded.

Close the landing gates and the hoist cage gates fully.

Push the UP or the DOWN button and hold in to go in the desired direction. STOP by releasing the button.

Hydraulic Lever Control Operation

Set the STOP button to the run position.
Depress the START button and then wait for the light marked 'ready' to come on.

Move the lever toward the UP or the DOWN indicator; the greater the movement of the lever, the greater the speed of the hoist.

To stop, move the lever to the NEUTRAL position or as per manufacturer's recommendations.

Note: At top and bottom landings the hoist cage will stop automatically due to the limit cams in the mast.

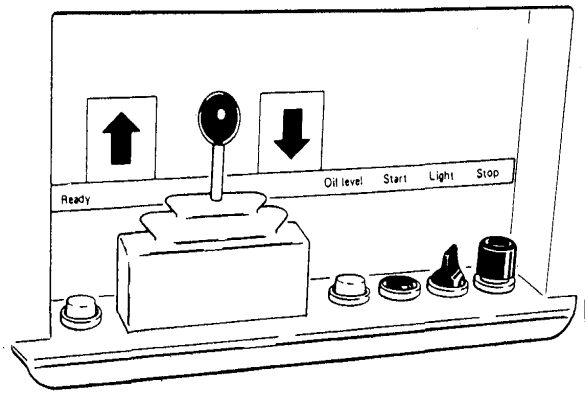
IMPORTANT! If the temperature is below 0ºc (+32ºF) the hydraulic system has to be warmed up by running half speed for approximately 5 minutes with a number of starts and stops.

Most hoists have lines painted on the cage door and the landing gate. When they are lined up it indicates the correct stopping position.

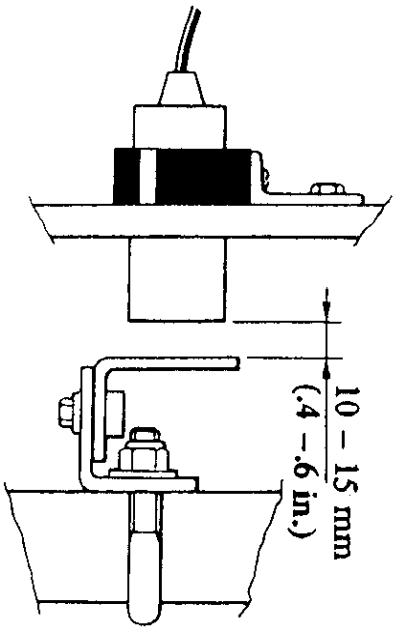
Intermediate Landing

If the hoist is equipped with a switch for automatic stop at the landing, cams must be installed at each landing.

The cams should be adjusted so that cage without load will stop approx 20mm (0.78in) above landing – irrespective of the direction of travel. The distance between proximity switch and the plate angles in the mast, should be 10-15mm in accordance with the figure.



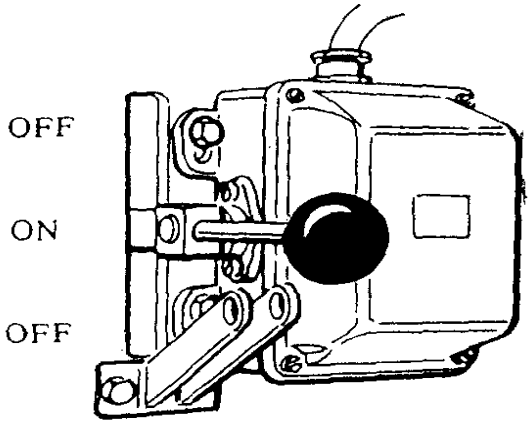
Typical Hydraulic Control Panel



<u>If the hoist does not start – check:</u>

- that the main on/off switch at the ground landing is in the “on” position and that the hoist is supplied with electric power;
- that no “emergency stop button” is in the depressed position;
- that the final limit switch on the machinery or safety plate is in the “on” position. If the final limit switch is activated – see heading “manual cranking”;
- that the roof trapdoor and cage doors are fully closed
- that all the landing bars or doors are fully closed;
- that the slack rope switch on the wire equalizer has not tripped-where counterweight equipment is supplied;

- that the “normal – installation/service” switch in the electric cabinet in the cage is in the “normal” position; and
- that no circuit breaker for control power has tripped out.



If the Hoist suddenly stops

If the hoist has stopped between landings due to a power failure or any other electric failure, such as blown fuses, tripped motor overload protector, etc. it can be manually lowered to the next lower landing for unloading of goods and passengers.

Hoists equipped with counterweights can in certain cases be raised in the opposite direction to the next upper landing, depending on the load ratio between the counterweight and cage.

As only one brake is used instead of multiple brakes, only slide the hoist short distances at very low speed in order not to exceed the normal operating speed of the hoist. If excess speed occurs, the hoists safety device, **(centrifugal cam)** will automatically trip and stop the hoist.

The centrifugal cam is a protection or safety device fitted to the hoist platform to prevent the hoist going into free fall.

The safety device must then be reset before the hoist can slide again. Please note: the safety device may only be reset by a competent person.

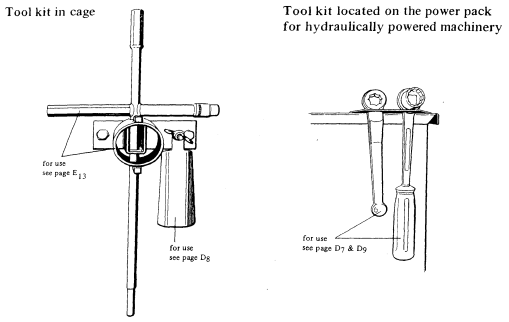
Sliding with electrically powered machinery

- First check applicable items on previous page;
- Switch off the main on/off switch on the electrical cabinet in the cage/cage roof;
- Lift the brake lifter on the motor (motors) to allow the cage to slide down to the next landing

IMPORTANT! Only slide short distances with maximum 1/3 of normal operating speed. Stop at least 1 minute every 20 metres (65 feet) so that the brakes have time to cool down, when the brakes become overheated they become damaged leading to a deterioration of the brake function; and

- If sliding of the cage is not possible – stay in the cage and call for assistance.

WARNING! Do not leave the cage – wait for qualified assistance.



Roof Controls

Roof controls must be used by maintenance personnel only. Hoist controls on the roof must be shrouded to prevent accidental activation of the manual reset EMERGENCY STOP button. The controls inside the cage must be inoperative when the roof controls are in use. When the hoist is operated from the roof for maintenance or repairs the controls must be switched over to the installation/service setting.

Power Failure

Hoist operators must know the procedure to follow in the event of power failure. The general procedure will vary according to the type of hoist. **Always follow the manufacturer's instruction.**

Sliding with hydraulically powered machinery

- First check applicable items on page 44. (if hoist does not start…);
- Switch off the main on/off switch on the cabinet in the cage/cage roof;
- Open the by-pass valve on the pump unit, which connects the inlet-/outlet sides of the motors;
- Lift both the motor brake lifters and slowly slide the hoist, to the next landing. Use the brakes alternatively to control the sliding speed – maximum 10 meters/brake, (33 feet/brake). The other brake is kept completely released while doing this;

IMPORTANT! Only slide short distances with maximum 1/3 of normal operating speed. Stop for 6-10 minutes every 20 metres (65 feet) to give the brakes time to cool down. When the brakes become overheated they become damaged leading to a deterioration of the brake function.

- close the by-pass valve when the sliding operation has been concluded;
- if sliding of the cage is not possible – stay in the cage, call for assistance.

Manual Cranking

If, due to heavy load and poor brake function, the hoist has been driven against the final limit cam at the bottom landing so that the power to the driving unit has been cut off, the cage can be cranked back manually to the normal landing level.
Motor brakes should be checked by trained/authorized service personnel, before the hoist is put back into service.

Cranking electrically powered machinery

To be carried out by trained service personnel only.

WARNING! The power must always be cut off by means of the main switch on the electric cabinet in the hoist cage and the final limit switch on the machinery or safety plate, before cranking may be carried out.

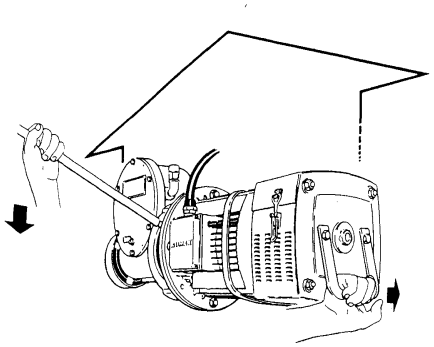
- Remove the inspection cover on the intermediate flange of the brake motor which is most easily accessible, when there are several brake motors;
- If there is more than one brake motor, lift the brake lifter on the other brake motors and insert the wedge so that the brake or brakes is/are released;

IMPORTANT! Use no more than moderate force when inserting the wedge. If excessive force is used when inserting the wedge, the effect may be the opposite due to overturning the magnet housing and locking the brake disc;

- Insert the lever from the hoist tool kit, in the highest accessible hole on the coupling inside the intermediate flange;
- Pull the lever downwards and lift the motor brake at the same time. The hoist cage will move upwards; and
- Reapply the brake between each turn of the crank.

Note: Cranking can be carried out against one applied brake if the hoist cage is unloaded.

WARNING! Replace the inspection cover and re move the wedge/wedges when the cranking is finished.



Cranking Operation

Cranking of hydraulically powered machinery

To be carried out by trained service personnel only.

WARNING! The power supply must always be cut off by means of the main switch on the electric cabinet in the hoist cage and the final limit switch on the machinery plate before carrying out cranking.

- open the by-pass valve on the pump unit which connects the inlet-/outlet sides of the motors;
- apply a socket with a ratchet spanner from the hoist tool kit, on the hexagon shaft end of the upper gear, beneath the removable protective cover on the fan side of the gear;
- release the lower motor brake with the aid of your foot and then hold it in released position;
- crank the hoist cage by lifting the upper motor brake lifter and at the same time pushing the ratchet spanner downwards. The brake must be reapplied between each turn of the spanner; and
- shut the by-pass valve and remove the socket and ratchet spanner when cranking is finished.

Do not forget to replace the protective cover on the hexagon shaft end.

WARNING! Never let go of the ratchet spanner during cranking without reapplying the brake.

Dangerous Goods

Always take a load of any dangerous substance directly to the required floor without stopping. Do not load the platform with other materials when moving dangerous goods. **Never transport dangerous goods of different classes at the same time.**

Clearances

When the cage is at the top landing there must be no less than 1.5 metres to the top of the rack.

When the cage is stopped by the final stopping devices there must be no less than 1.2 metres to the top of the rack.

The final section (or tower module) must be fitted above the top section of the rack and must not be less than 1.5 metres in height. The final section must not be fitted with a rack.

When the cage is sitting at its lowest point on fully compressed buffers there must be at least 600mm between the underside of the cage and the floor of the pit. (the above clearances are specified in the Lift code Australian Standard 1735 Part 2.)

Gates and Landings

The landings and the inside of the cage must have effective protective mesh fixed to a steel pipe or angle iron frame work.

Door entrances must have at least 1.8 metres overhead clearance.

Doors must have 9mm square, 2.5mm wire mesh over a steel frame.

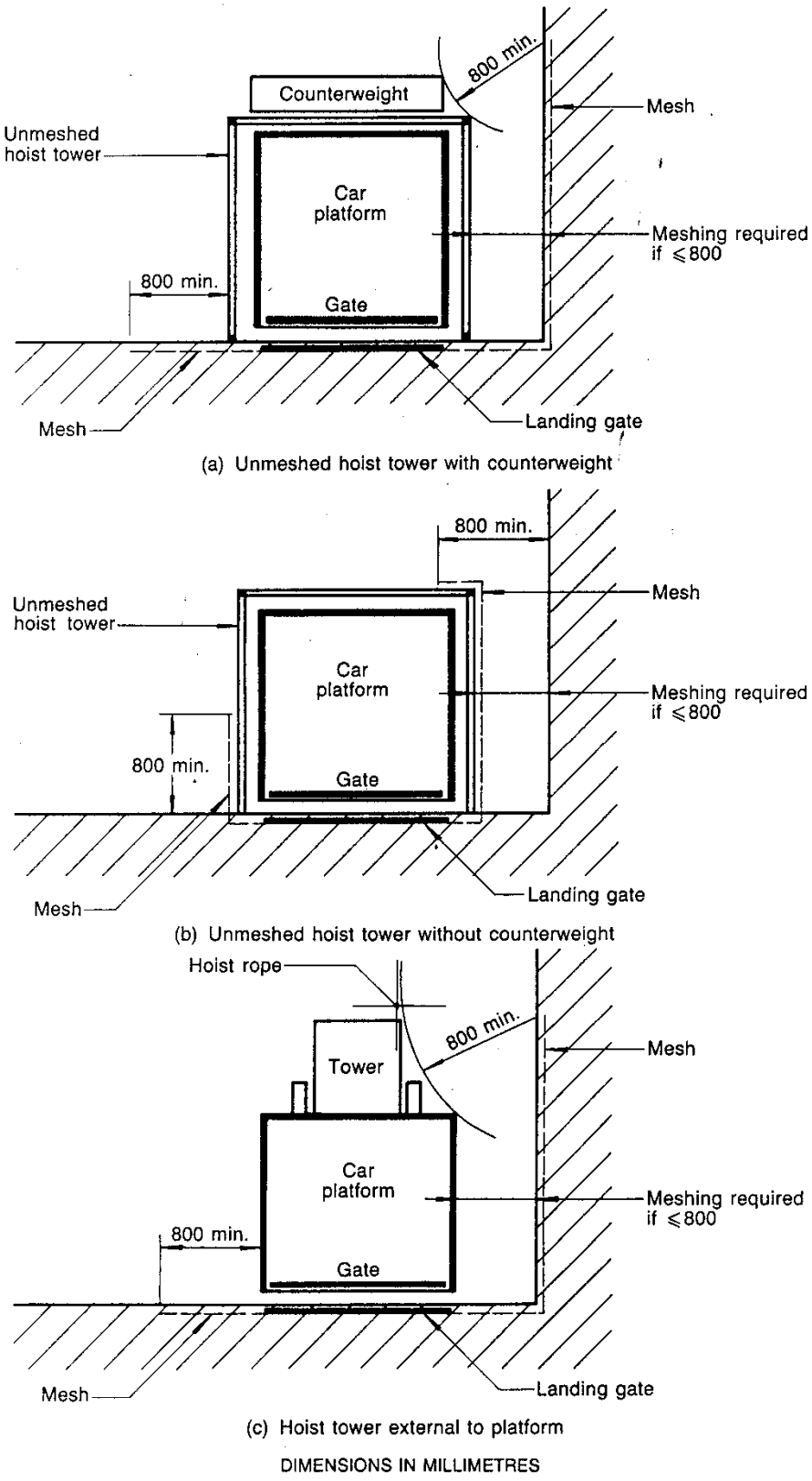
The doors must not deflect more than 25mm under forces exerted in normal working conditions (1kg over .1m^2)

Doors must be no more than 150mm from the edge of a landing. They must fit flush with the surrounding mesh enclosure to form an effective guard.

The clearance between the floor of the cage and the landing must not be greater then 50mm.

Protective mesh must be provided at all landings for 800mm both sides of the gate opening and at all floors and openings that the hoist may pass. (see details of examples as per A.S.1418.7) on page 47.

Examples of Protective Meshing At Landings (As1418.7)



Car Construction

Cars must have a steel frame fully enclosed on the sides, top and gates. It must not deflect more than 25mm under forces exerted during normal working conditions.

The gate ends and the sides must be covered with steel or timber up to 1.2m above this must be covered by 30mm^2 steel wire mesh. If there is less than 100mm from the cage to moving parts the mesh size must be 10mm square.

The gate in the cage must sit fully within the floor line of the cage and the door counterweight must have an enclosure to slide into.

The cage must measure no less than 2 metres from the floor to the ceiling.

Car Roof and Trapdoor

The car roof has a hinged trap door with an electrical interlock. It must be strong enough to withstand any material falling from above.

There must be a ladder inside the cage at all times to provide access to the trapdoor.

Lighting

The cage must have lighting that allows for safe operation (i.e adequate safe egress and access) and maintenance of the hoist. In addition to the light inside the cage there must be a permanently wired hand lamp for use on the roof.

There must also be an emergency light that will operate in the event of the failure of the main light.

Controls

The switch that controls the operation of the cage must be inside the cage and return to the stop position when it is released.

Load Plate

A load notice plate must be displayed in the cage with the following details:

- maximum load capacity;
- materials kg;
- number of passengers; and
- combined weight of materials and passengers.

NB: For combined loading of passenger and materials the weight of a passenger is 100kg.

Car Door and Landing Interlocks

There must be a gate on each floor fitted with a lock that can only be released from inside the car.

Each door must be interlocked so that the hoist will not operate unless all doors are closed and locked. Locks must be enclosed by metal cladding, be weatherproof, fail safe and bolted to the door frame.

The gate on the lowest landing can be opened by key by the hoist operator from the landing, but only if the cage is within 230mm of the landing.

Limit Switches

Working limit switches are set at the top and bottom of the tower to prevent the cage overrunning.

Limit switches must be metal clad and weatherproof and the cams must be constructed of steel.

In the event of failure of the working limits there is also a full current limit switch which will cut off all power to the hoist if the hoist travels beyond the top or bottom landing.

If any of the full current limit switches are tripped they must be reset and checked by a qualified electrician.

Electrical

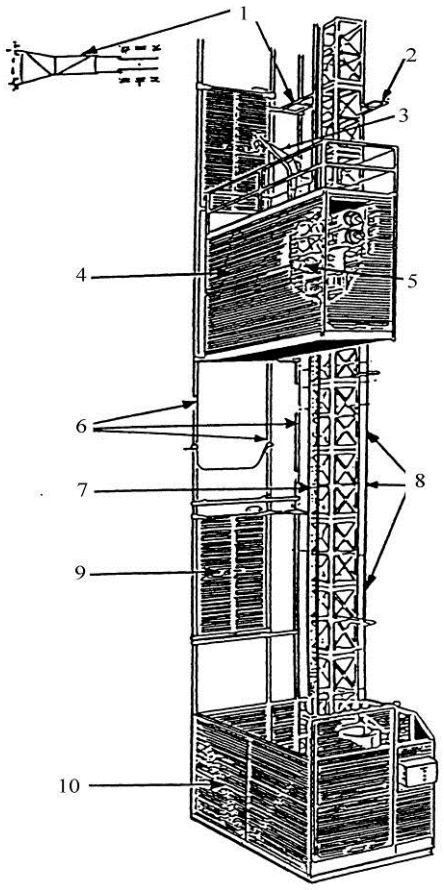
All wiring must be insulated with PVC and where the wiring enters switch gear the PVC must not be distorted.

All metal armouring for cables and other electrical equipment must be earthed by wire no less than 2.5mm. (Earth Leakage Protection Circuit).

The control fuse must have the maximum current capacity clearly marked.

Fuses must only be replaced by a qualified electrician.

Structural Components of Alimak Hoist



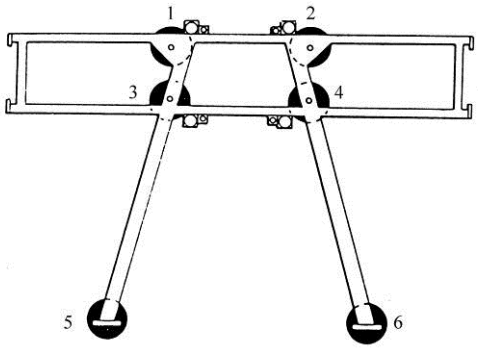
1. Pipe Tie
2. Electric Cable Guide
3. Erection Crane
4. Cage
5. Drive Unit
6. Gate Pipes
7. Drive Rack
8. Tower Sections
9. Gates
10. Security Cage

Base Frame

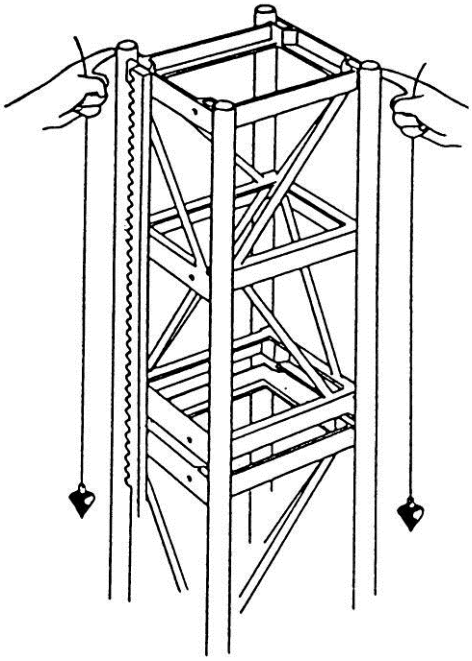
Note the position of the hold down bolts in the base frame drawing.

Vertical Tower

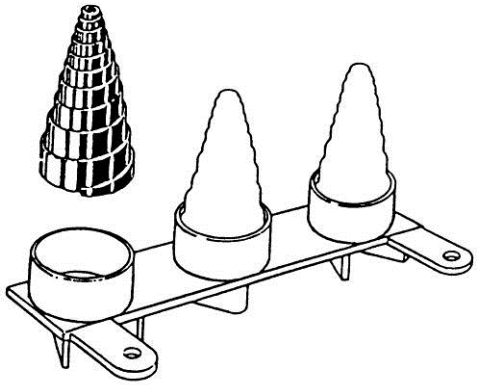
Use a plumb bob to check if the tower is vertical.



Base Frame



Verticle Tower



Note: Buffer brackets and buffer springs occur in a number of variations.

Cracked or dislodged buffer springs may indicate that the hoist car has overrun lower limits.

Mast Ties

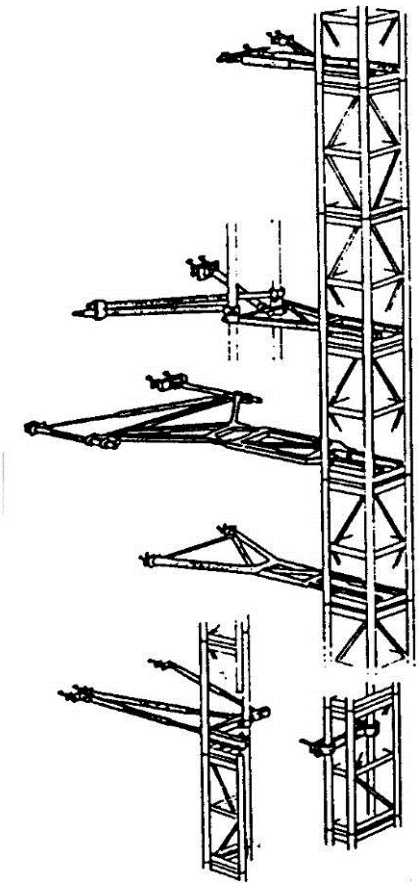
For each installation and set-up the type of tie must be chosen to suit the particular installation.

There are two (2) types of brackets used in the construction of hoist ties.
(H) Bracket and
(Y) Bracket.

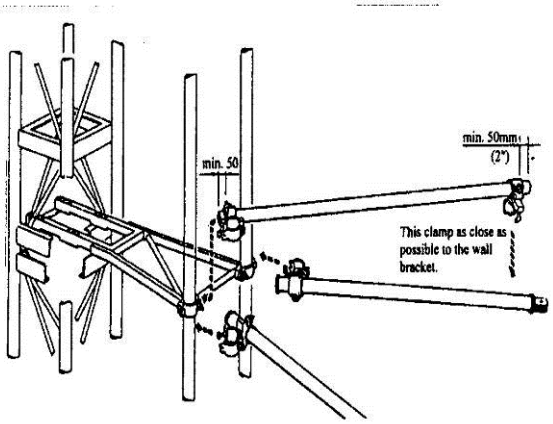
(H) Bracket is used to tie the gate and landing pipes to the tower and only clips to one side of the tower to the pipes.

(Y)Bracket is used when a building tie is used to support the tower. This bracket is longer and is designed to pass through the tower and bolt on both sides.

Building ties should be at 9M intervals (6 towers) but can have longer spacing with a structural engineer's permission.

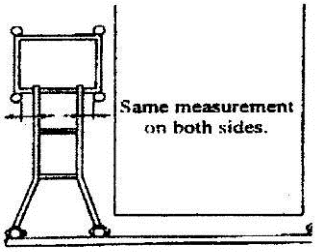


“Y” Bracket


min. 50mm
(2")
min. 50
This clamp as close as possible to the wall bracket.

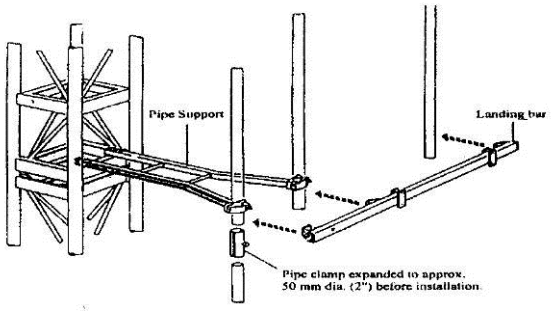
Installation of Pipes

“H” Bracket



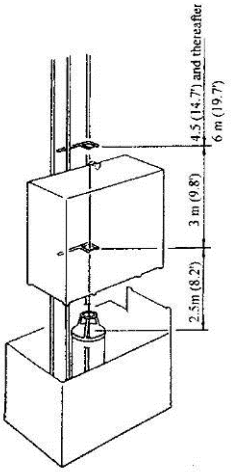
If the hoist is supplied with vertical pipes for landings, these shall be installed parallel to the hoist. The pipes must be tied with pipe supports and landing bars every 3 metres. (2 tower sections)

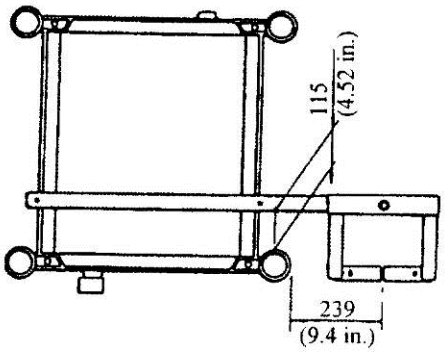
If the landing bars are to be equipped with landing bridge, the bars may be placed anywhere between the pipe supports, but at maximum intervals of 3 metres.



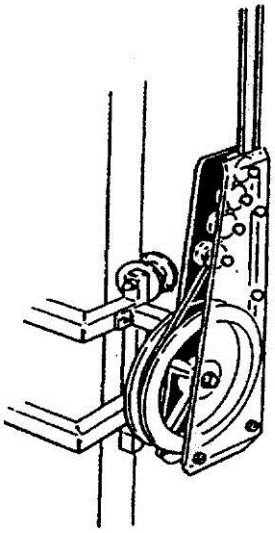
Installation of Cable Guides for Hoist Provided Guiding Device

Install the first cable guide approx. 1.5m above the cable basket. The second after another 4.5m and the remaining at 6m intervals. When erecting at a site which can be considered windy the distance 6m must be reduced to 4.5m, adjust all guides individually again to ensure proper installation, i.e. the cable holder of the cage passes just between the guide springs.





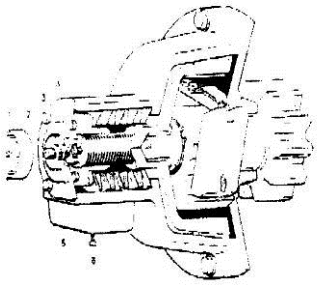
Note: Some cable guys work on a roller system that runs up and down the outside of the mast.



Typical cable guy roller system

The safety device operates as follows:

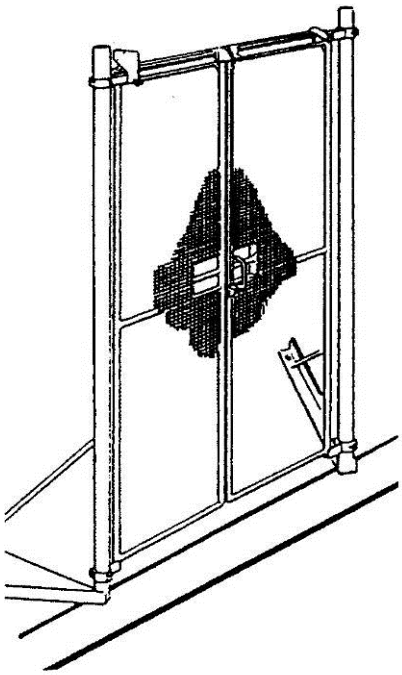
- the pinion of the safety device is driven by the rack. At normal speeds, a centrifugal weight is retracted, allowing the pinion to rotate freely;
- at excessive speeds, the centrifugal weight is thrown outwards and connects the pinion to the brake cone; and
- the brake cone is screwed against the brake drum. The hoist is brought to a smooth halt and simultaneously the power of the driving unit is cut off.



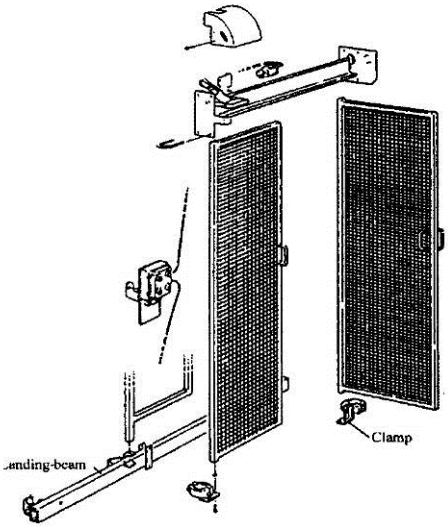
Typical safety device

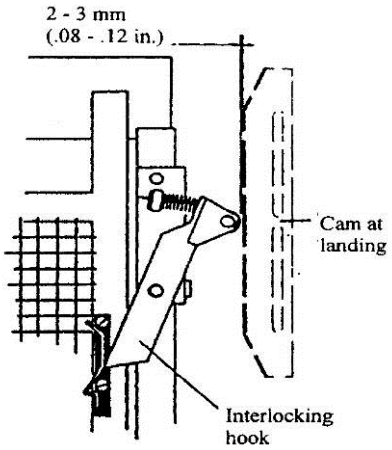
Mechanical Cam on Cage Door

The interlocking hook shall be in the centre of the cam when the cage floor is on the same level as the landing. The play between the interlocking hook and the cam should be 2-3mm when the cage door is completely closed.



Door

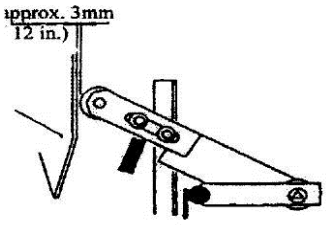




Parts of or diagram needs to be clearer

Limit Cams

Always depress the red 'Emergency stop" button to prevent unintentional moving while work is carried out on the hoist mast.



Typical Limit Cam

Top Landing

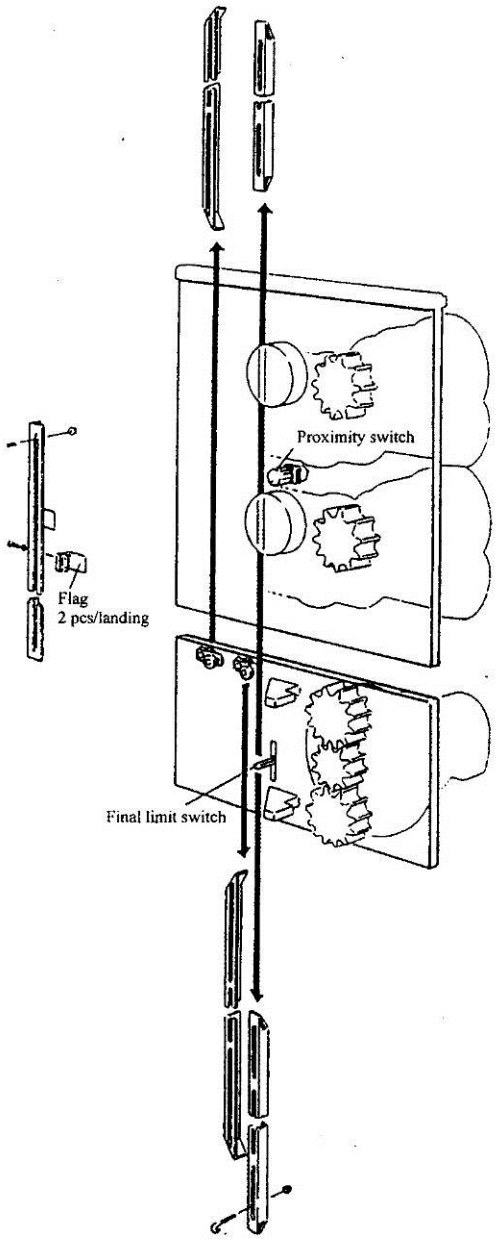
Install the upper limit cam and adjust it so that the cage will stop exactly level with the landing.
Install and adjust the final limit cam with its limit switch 80 – 100mm above the final limit cam.

Intermediate Landing

If the hoist is equipped with a switch for automatic Stop at the landing, cams must be installed at each landing.
Adjust the cams so that the cage without load will stop approximately 20mm above landing irrespective of the direction of travel.
The distance between proximity switch and plate angles in mast should be 10 – 15mm.

Ground Landing

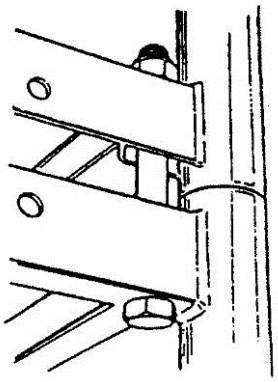
The lower limit and the final limit cam must be installed and adjusted during installation so that the cage without any load will stop 30 – 40mm above the bottom enclosure sill.


Proximity switch
Flag
2 pcs/landing
Final limit switch

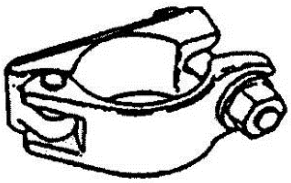
Tightening Torque

Recommendations according to the chart on the following page applies in general except for:

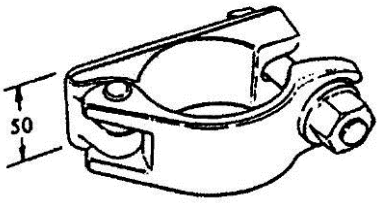
ALIMAK MAST BOLD, DIM.1" UNC
Torque 300mm
Spanner size 11/2"



ALIMAK SCAFFOLD CLAMP 48MM
Torque 80Nm
Spanner sixe 23mm

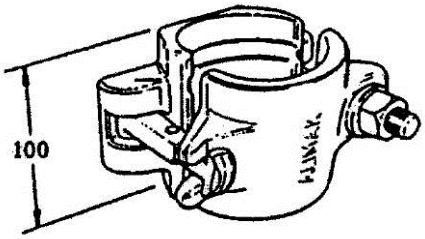


ALIMAK SCAFFOLD CLAMP 76MM
Torque 150Nm
Spanner size 28mm



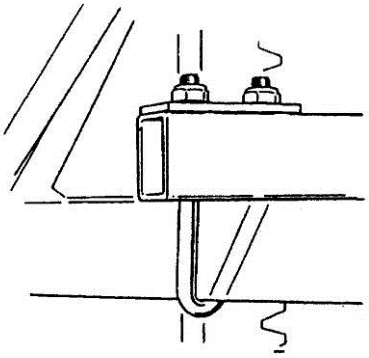
ALIMAK SCAFFOLD CLAMP 76MM

Torque 220Nm
Spanner size 24 to 27mm



ALIMAK U-BOLT, DIM.M12

Torque 90Nm
Spanner size 19mm



Recommended Torques

The chart applies to galvanised bolt and nut of strength class 8.8 – dry surface.

		Torque	
Dimension	**Spanner Size**	**Nm**	**Lbf x ft**
M6	10mm	10	7
M8	13mm	24	18
M10	17mm	47	35
M12	19mm	81	60
M14	22mm	128	95
M16	24mm	198	146
M20	30mm	386	285
M24	36mm	668	493
¼”UNC	7/16”	11	8
3/8”UNC	9/16”	39	29
½”UNC	¾”	94	69
5/8”UNC	15/16”	186	137
¾”UNC	1 1/8”	327	241
1”UNC	1 ½”	783	577
1 ¼”UNC	1 7/8”	1549	1124

REVIEW QUESTIONS

1. How often should a hoist be serviced?

2. Why do we do a test run of the hoist prior to operation?

3. Where do you document any repairs or alterations to a hoist?

4. List three defects that would condemn a sheave?

5. List three ways of securing the hoist?

6. Can you exceed the SWL of a hoist?

7. List 4 procedures you need to consider when preparing an operational plan?

8. What hazards would you need look for before operating a hoist? (List 6)

9. List 5 hazard control measures you would need to consider?

10. Why should we co-operate with relevant workplace rules and procedures?

11. Why do we communicate with other workers in an emergency?

12. Why do we need to develop a set of procedures for an emergency situation?

13. How often would you test the emergency lowering device?

14. At what height would you leave the hoist when testing the emergency lowering device?

15. Describe the emergency evacuation procedures for hoist personnel in an emergency such as a fire?

16. What would you do if the power lead for a hoist was lying in water?

17. Can the power lead for a hoist be attached to a metal scaffold?

18. What must be connected to the power supply to protect personnel from electrical hazards?

19. What action would you take if other equipment in the area of the hoist represented a hazard?

20. Can you set up a hoist over an underground service?

21. Can an electric powered hoist be set up near a petrol station?

22. Who would you report defective equipment to?

23. What is the purpose of interlocking devices on hoist gates?

24. What overhead protection is needed for the hoist driver?

25. When a hoist is set up within a building, what special requirements are required regarding barriers and fences?

26. What is provided on a hoist to protect against free falling platforms?

27. Can you set up a hoist in front of access ways?

28. What is the safety factor for wire rope when lifting personnel?

29. If a hoist passes a window or opening, what must be done?

30. When should gates and lights be provided on a platform hoist?

31. Why should manual lowering of a hoist be done at slow speed?

32. If you cannot tie a hoist tower to a building, what other method can be used?

33. A loaded hoist stops suddenly between floor, What action would you take?

34. Can anything other than FSWR be used as a guy?

35. Who is responsible for the erection and tying of a hoist?

36. As the hoist driver why must you be aware of the structural stability of the hoist. List two methods used to stabilize the hoist?

37. What height is a hand rail to be set at and how far back from the base of the tower must it be erected?

38. What is the minimum and the maximum gap allowed between the platform and the landing or floor?

39. What are the minimum requirements for a hoist gate?

40. Who would you report tampering to the hoist to?

41. What are the minimum distances you can set up a hoist near?

(a) Distribution power lines

(b) Transmission lines

42. What are the spotter distances that apply to power lines for?

(a) Distribution power lines

(b) Transmission lines

43. Are there any circumstances where the distances may vary?

44. Can hazardous substances of different classes be transported together?

45. What effects can strong winds have on the operation of a hoist?

46. What is the importance of having a well lit work area?

47. List 3 moving parts of a hoist you would inspect if an abnormal noise?

48. What would you do if you heard a loud noise coming from the hoist?

49. Why are there two red light on a hoist?

50. Can you move a platform if there is a red light showing?

51. What checks need to be made with the signaling system (lights, bells etc)?

52. If one of the main controls was defective, who would you report to for rectification?

53. What action would you take if you notice one of the tower connection bolts were loose?

54. What would you do if there was a fault in the communication system?

55. If there was a fault with any of the warning lights or alarms, what action would you take to have the fault rectified?

56. What is the purpose of the travel limit device?

57. If the travel limit device was faulty are you permitted to repair it?

58. What type of signaling systems are approved for use with hoists?

59. If form workers are erecting formwork on the upper levels, what would you have to be aware of?

60. How do you determine if a hoist can lift a particular load?

61. Determine whether the hoist you are operating can lift the following loads?

(a) Can carry 20 people.

(b) Can carry 25 3m scaffold tubes (12kg each)

(c) A pallet carrying 4 200lt drums full of water?

(d) Could the combine weight of a pallet of bricks and a powered pedestrian forklift overload a 1.8ton capacity hoist?

62. Why is it important to correctly stow and secure a hoist and equipment when shutting down?

CPCCLHS3001A
LICENCE TO OPERATE A PERSONNEL AND MATERIALS HOIST
COURSE HANDOUT

Please revise the following information.

Legislative requirements

There are responsibilities that apply to high risk licences holders under workplace health and safety legislation. They must:

- Provide their name/evidence of identify and photograph with any application for HRW Licence.
- Provide a copy of a certificate that they have successfully completed a unit of competency relevant for the class, with a HRW Licence application.
- Not give false or misleading information
- Make a declaration that they do not hold a equivalent HRW Licence granted by another WH&S regulator.
- Make a declaration to whether they have ever been convicted or found guilty of any offence under WH&S Law in Australia.
- Declare if they have had an equivalent HRW Licence refused, suspended or cancelled under WH&S Act or WHS Regulations in Australia and provide details.

A statement of attainment issued by a (RTO) Registered Training Organisation or a Notice of Satisfactory Assessment issued by an Assessor is only valid for sixty days from the date of issue.

A HRW Licence needs to be renewed every five years.

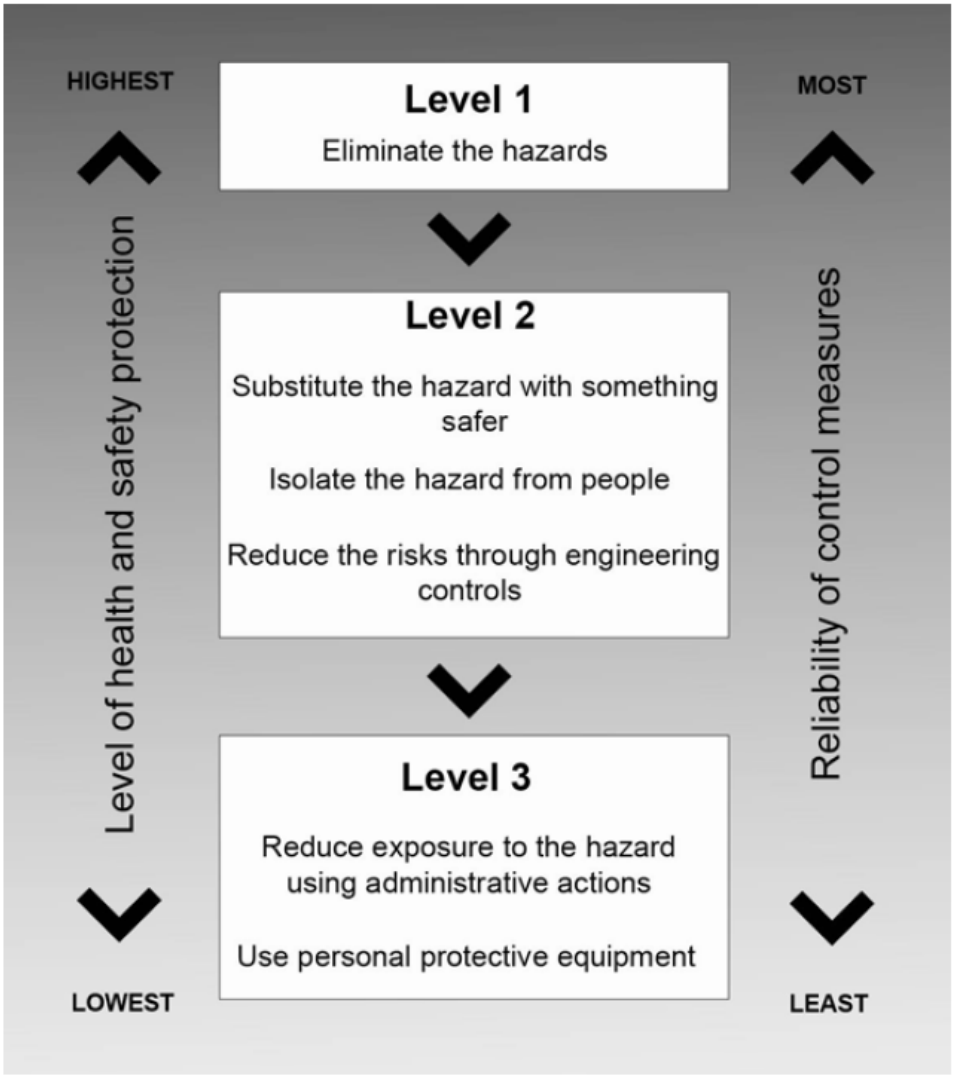
A Trainee is defined as under the WH&S Regulation as a person who is receiving formal training and informal learning in a class of HRW.

An employer cannot allow a person to perform HRW if they know they are not competent.

A HRW Licence holder when they are no longer competent to do the work they hold the licence for, have to stop and cease work immediately.

The responsibilities of a HRW Licence holder when undertaking high risk work must take reasonable precautions and exercise proper diligence in performing the high risk work.

Under WH&S Regulations you can be penalised for failing to exercise proper diligence when performing HRW relating to their licence class. Failing to work safely they can be suspended or cancelled or if the matter arises at renewal, the regulator will refuse to renew your licence.



HIERARCHY OF CONTROL

1. Elimination
2. Substitution
3. Isolation
4. Engineering control measures
5. Administrative practices
6. Personal protective equipment

HOIST CALCULATION EXAMPLES

EXAMPLE 1

The load to be moved is a number of boxes with window joiners in it.

a. The WLL of the hoist is 3000kg
b. The operators weight is 110kg
c. The blocks are on a pallet and trolley
d. The known weight of the pallet and trolley is 120kg
e. Each box weighs 40kg

Q.

Including the pallet and jack, how many boxes present a ‘safe lift’ on the hoist?

A.

Amount the hoist can lift = 3000kg

3000kg – 120kg – 110kg = 2770kg

The number of boxes that can be lifted = 2770kg ÷ 40kg = 69 boxes

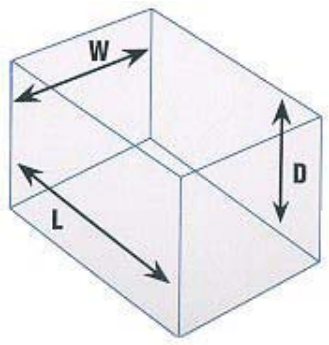
EXAMPLE 2

The load to be moved in a hoist is rectangular blocks of concrete

Concrete has a mass of 2400kg per cubic metre.

a. The WLL of the hoist is 2000kg
b. The blocks are on a pallet and pallet trolley
c. The known weight of the pallet and trolley is 120kg
d. The operators weight is 90kg – the dimensions of each block
    - Height = 250mm
    - Width = 250mm
    - Length = 1 metre

(CALCUATION FOR VOLUME IS L x W x H = cubic Volume)



Q.

Calculate how many blocks can be lifted on the hoist? Show the working calculations and the answer.

A.

WLL = 2000kg – Operator weight (90kg) = 1910 kg

= 1910 kg – pallet and trolley (120kg) = 1790kg

Volume of the block = 0.25 x 0.25 x 1.0 = .0625 cu3

The weight of one block = .0625 cu3 x 2400kg = 150kg

The number of blocks that can be safely lifted = 1790kg ÷ 150kg = 11.93 blocks

Answer = 11 blocks (rounded down)

EXAMPLE 3

The hoist has a WLL of 3000kg,

Load to move is;

a. Scaffold counter weights each weigh = 20kg
b. The counter weights are on a pallet and pallet jack, the combined weight of the pallet and jack is 180kg
c. On the pallet are 35 counter weights
d. The operators weight is 90kg

Q.

Can you move this load on this hoist? Show calculations and a answer.

A.

Total weight of counter weights to be lifted = 35 x 20kg = 700kg

Total load to be lifted = 700kg + 180kg +90kg (operator) = 970kg which is under the WLL of 3000kg.

The load can be lifted.

EXAMPLE 4

Q.

How many lifts are required to move the following on a hoist with WLL of 1000kg?

a. 25 bags of cement, each weigh 18kg
b. 4 drums of water, each weigh 200kg

Show the calculations and answer?

A.

Total weight of cement = 25 x 18 = 450kg

Total weight of water = 4 x 200kg = 800kg

Total weight to be lifted = 1250kg

Total number of lifts required = 1250kg ÷ by 1000kg = 1.25

Minimum of 2 lifts would be required