ACCREDITED PLANT TRAINING

PLANT OPERATORS

SAFETY

AWARENESS

TRAINING

Viewfoils

14. Safety with Earthmoving Plant

CITB CONSTRUCTION INDUSTRY TRAINING BOARD

CIN 074/14
Third Edition 1993
Revised 1994

RESPONSIBILITIES OF WORKERS ON CONSTRUCTION SITES

MUST AT ALL TIMES:

- **Fully comply with directions given**
- **Not endanger themselves or others through negligence**
- **Not tamper, misuse or recklessly interfere with anything provided for their own safety, or safety of others**
- **Not ignore potentially dangerous situations**

PRECAUTIONS DURING MAINTENANCE

NEVER remove guards or cowlings from machinery in motion

ALWAYS use authorised body supports for vehicles, and attachments supports for plant machines

NEVER work under vehicle bodies or machine attachments unless properly supported

ALWAYS release pressure in system, before working on hydraulic/air powered systems

CIN 074 - 14/2

PRECAUTIONS DURING MAINTENANCE

ALWAYS release tension in steel ropes/cables before carrying out work

NEVER use flammable liquid(e.g. petrol) for cleaning purposes

NEVER smoke near fuels or batteries

ALWAYS dispose of cleaning rags, etc., into waste disposal containers

TYPICAL DAILY MAINTENANCE SHOULD INCLUDE:

Checks of:	**Engine oil, fuel, coolant, hydraulic oils, transmission oil**
Lubrication:	**as per manufacturers schedule or company regulations**
Inspection:	**General check of machine for cracks, damage, leaks etc.**
Clean:	**Windows, mirrors, lights, indicators**

TYPICAL DAILY MAINTENANCE SHOULD INCLUDE:

Starting the engine

Before starting check that:

- parking brakes are applied
- gears are in neutral (out of gear)
- all other controls are disengaged

REPORT ANY DEFECTS TO SUPERVISION

TYPICAL DAILY MAINTENANCE SHOULD INCLUDE

After Starting:

Always allow the engine to warm up at a fast idle speed

Check:

Correct pressure guage readings and charging circuit indicator

Correct operation of controls, switches, steering and brakes

Adjust:

Seat for comfort and eficiency and mirrors for proper rear view

REPORT ANY DEFECTS TO SUPERVISION

CIN 074 - 14/6

DURING OPERATION OF MACHINE

Check for:

Hazards - People in vicinity, trenches, cables etc.

Always:

- **Wear seat belts if fitted**
- **Drive/operate at safe speed, consistent with site conditions**
- **Be alert to presence of workers on foot, and other machines/vehicles in area**
- **Be alert for new hazards as work proceeds: obstruction, soft ground etc.**
- **Never carry passengers unless seating provided**

CIN 074 - 14/7

DURING OPERATION OF MACHINE

- Never allow personnel to ride in an unauthorised position i.e. bucket, skip
- Never free wheel when vehicle is in motion
- DO NOT RACE OTHER MACHINES or indulge in "horseplay"
- Never reverse a vehicle/machine without being sure it is safe to do so
- Always keep a safe distance from tip edge, and always use a approved stop block when tipping into excavations etc.

CIN 074 - 14/8

AFTER OPERATION

Park machine on level ground whenever possible, and clear of excavations

Then:

- **Apply the parking brakes**
- **Disengage the gears**
- **Lower attachments to the ground**
- **Stop the engine**
- **Release hydraulic pressure in system by operating controls**
- **If machine is rope operated, release rope tension**
- **Remove ignition key, lock cab and windows**

PERSONAL PROTECTIVE EQUIPMENT

PLANT OPERATORS - Duty to wear appropriate protective clothing and safety equipment

Typical equipment available:

- **Overalls**
- **Wet weather clothing**
- **Safety boots**
- **Safety helmets**
- **Gloves**
- **Goggles**
- **Ear defenders**
- **Face masks**

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

For the protection of persons employed on construction sites and to promote safe conduct of work

Includes safe practice:

- **excavations**
- **cofferdams and caissons**
- **demolition, transport locomotive, trucks and wagons**
- **mechanically propelled vehicles.**

CIN 074 - 7/1

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

OBLIGATIONS OF EMPLOYERS

Ensure all regulations are observed

Comply with specific regulations

i.e. excavations, demolition

OBLIGATIONS OF EMPLOYEES

Obey regulations

Report defects to employer or employers representative

(Regulation 3)

CIN 074 - 7/2

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

INTERPRETATION OF TERMS

Locomotive - any self propelled vehicle on wheels or operating on rails

Plant and Equipment - any device or machine, i.e. concrete mixer etc.

Truck or Wagon - trucks or wagons operating on wheels or rails

(Regulation 4)

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

Inspection of Excavations, Shafts, etc.

Every day that people are working in ANY Type of Excavation, Shaft, Tunnel etc.

Inspection MUST be carried out by a competent person

THOROUGH EXAMINATIONS MUST be carried out after explosives have been used, and after any damage to the trench sheeting or timbering, or after any fall of material, and in any case every seven days

(Regulation 9)

CIN 074 - 7/4

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

GUARDRAILS/BARRIERS

Accessible parts of excavations or openings in ground more than 2.0 metres deep near where persons work, or pass, must be protected at the edges e.g. guardrails/barriers

(Regulation 13)

SAFEGUARDING EDGES

Plant - machinery - material kept away from edges of excavations Avoid collapse of sides Avoid material falling on persons working (Regulation 14)

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

LOCOMOTIVES, TRUCKS, AND WAGONS Every locomotive must be fitted with efficient brakes

Trucks and wagons should have efficient brakes UNLESS method of use is safe without them (Regulation 29)

Locomotives, capstans, winches, mechanical propelled vehicles and trailers may only be driven by trained and competent persons at least 18 years of age. Provided they are DIRECTLY supervised by a qualified driver, they may operate such equipment whilst being trained (Regulation 32)

CIN 074 - 7/6

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

MECHANICALLY PROPELLED VEHICLES

Must always be in good working order

Not used in improper manner

Not be overloaded or so unevenly loaded that they cannot be operated safely (Regulation 34)

Persons must not ride on vehicle unless provision has been made (Regulation 35)

Driver shall not remain on road or rail vehicle being mechanically loaded with loose material unless adequate protection of cab, i.e. specially designed or strengthened (Regulation 36)

Where vehicle used for tipping material into excavation or pit. Measures must be taken to prevent vehicle overrun, i.e stop blocks (Regulation 37)

CIN 074 - 7/7

THE CONSTRUCTION (GENERAL PROVISIONS) REGULATIONS 1961

FENCING OF MACHINERY

Potentially dangerous parts, e.g. flywheels, shafts, gears etc. must be properly guarded

(Regulation 42)

CIN 074 - 7/8

ACCIDENT STATISTICS Reported to HSE 1990-91

	Major Injury	Fatal
All Industries	31203	572
Construction Industry	3961	133

NB

Not all accidents are reported

THE COST OF ACCIDENTS

Cost to the victim

Costs to the firm

Cost to persons directly responsible

Cost to the working group

Cost to the nation

CIN 074 - 2/2

FACTORS LIKELY TO AFFECT SAFETY AT WORK

Personal Factors

Job Factors

Environmental Factors

CIN 074 - 2/3

ATTITUDES OF PEOPLE

Attitudes of people at work

often play an important part

in accident prevention

SAFE ATTITUDES = SAFE ACTIONS

= SAFE CONDITIONS

CIN 074 - 2/4

TYPES OF HAZARDS

Obvious Hazards

Potentially Dangerous Hazards

Operational Hazards

CIN 074 - 2/5

ACCIDENT PREVENTION

The accident trend can be influenced by:-

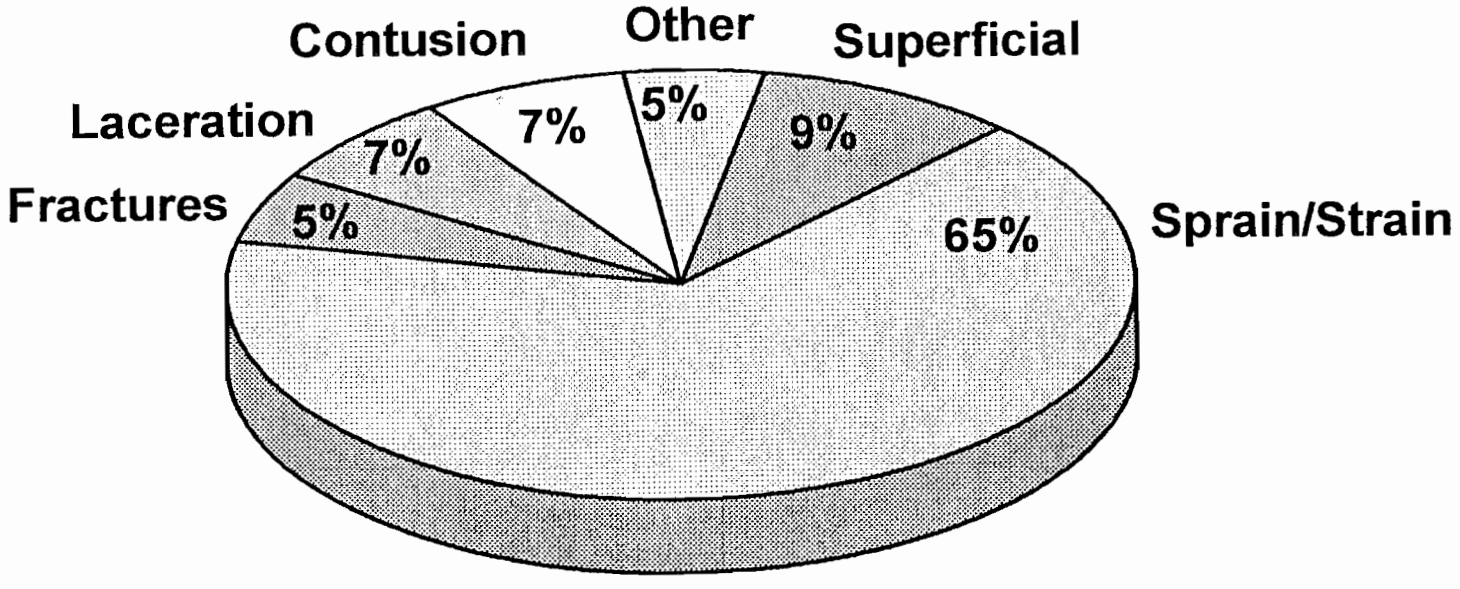
Adequate training and supervision to CONTROL

THE WORKER

THE ENVIRONMENT

THE EQUIPMENT MACHINE

TYPES OF INJURY CAUSED BY HANDLING ACCIDENTS



CIN 074 - 5/1

THE MANUAL HANDLING OPERATIONS REGULATIONS 1992

The Regulations establish a clear hierarchy of measures:-

1. **Avoid hazardous manual handling operations so far as is reasonably practicable**
2. **Assess hazardous manual handling operations that cannot be avoided**
3. **Reduce the risk of injury so far as is reasonably practical**

BEFORE LIFTING AND HANDLING

Establish:-

1. **What has to be moved?**

2. **How far and from where to where?**

3. **Can it be safely handled by one person?**

4. **Will assistance be required?**

COMMON INJURIES

Sprain and Strains

Cuts and Abrasions

Back Injuries

Crushing of Limbs

CIN 074 - 5/3

THE LOAD

May be:-

large and heavy

bulky and unwieldy

difficult to grasp

unstable

rough with sharp edges

KINETIC METHOD OF LIFTING

Main features:-

utilises the strong leg and thigh muscles

the spine remains straight

uses momentum of body weight to initiate forward movement

CORRECT POSTURE

Important points:-

- correct position of feet
- flexible knees
- straight back
- arms close to body
- correct grip
- chin in, head up
- use of body weight

FORMS OF MECHANICAL ASSISTANCE

Include:-

simple lever

a hoist

trolley - sack truck

chutes

hooks and suction pads

plant and equipment

TRAINING PROGRAMME FOR SAFE MANUAL HANDLING

Should include:-

Recognizing potentially hazardous handling operations

Dealing with unfamiliar operations

Use of handling aids

Use of personal protective equipment

Importance of good housekeeping

Factors affecting individual capability

Good handling technique

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

Impose requirements as to

CONSTRUCTION

USE

EXAMINATION

of lifting appliances and

lifting gear used in

the construction industry

CIN 074 - 10/1

THE CONSTRUCTION (LIFTING OPERATIONS) 1961

OBLIGATIONS

Employers

Must ensure, where employees are:

- **Working on or near a hoist**
- **Using a hoist**
- **Carrying out lifting operations**

CIN 074 - 10/2a

THE CONSTRUCTION (LIFTING OPERATIONS) 1961

OBLIGATIONS

That loads are secure and safe

All records of tests, examinations and inspections are kept

Must comply with regulations applicable to type of lifting plant or gear being erected or used

Employee

Must comply with Regulations

Must report defects

(Regulation 3)

CIN 074 - 10/2b

LIFTING GEAR

Includes:

Slings

Rings

Links and Hooks

Plate Clamp

Shackles

Swivels or Eye Bolts

(Regulation 4)

CIN 074 - 10/3

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

CONSTRUCTION AND MAINTENANCE

Every lifting appliance, and every part thereof:

Must be:

- **Properly constructed**
- **Strong enough for the work intended**
- **Be kept in good order**
- **Inspected weekly by competent person**
- **Record of inspection kept**

(Regulation 10) CIN074 - 10/4

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

PLATFORMS FOR CRANE DRIVERS AND SIGNALLERS

Where provided, must be:

- **Large enough for person to work properly**

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

- Close boarded or plated and provided with safe means of access and egress
- Provided with a guardrail at 910 mm height and toeboards
- The space between guardrail and toeboard must not exceed 765 mm

(Regulation 13)

CIN 074 - 10/5b

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

N0 CRANE, CRAB, WINCH, Pulley Block, or gin wheel must be used unless a certificate has been issued showing:

- **The safe working load or loads**
- **In the case of a crane with variable operating radii (including a crane with derricking jib) the radii of the jib, trolley or crab, appropriate to the specified safe working load (SWL)**

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

- In the case of a crane with a derricking jib, the maximum radius at which the jib may be worked

Regulation 28

LIFTING ACCIDENTS

Caused by:-

Misuse

Abuse

Neglect

by operator or supervisor

CIN 074 - 9/1

UNSAFE WORKING AND ACCIDENTS

Result from:-

Lack of training or knowledge

Poor maintenance

Correct plant or equipment not being available

Misuse of plant or equipment

Hurry to get job done

SAFE WORKING LOAD (SWL)

The maximum load which can be safely handled by a crane

includes the weight of the hook block and all the lifting gear

SAFE SYSTEMS OF WORK

Effectively communicated

Must include:

- **Planning and suitable cranes**
- **Maintenance and testing of equipment**
- **Supervision of work**
- **Test certificates and documents**
- **Prevention of unauthorised use**
- **Safety of all persons**

CIN 074 - 9/4

THE CONSTRUCTION (LIFTING OPERATIONS) REGULATIONS 1961

- Close boarded or plated and provided with safe means of access and egress
- Provided with a guardrail at 910 mm height and toeboards
- The space between guardrail and toeboard must not exceed 765 mm

(Regulation 13)

CIN 074 - 9/4a

STABILITY

A crane must have a stable and level base

Ground must be able to carry:-

- **Severe static and dynamic loads**
- **Weight of the crane**
- **and**
- **Weight of the load**
- **Wind stresses**
- **Shock loading**

CONTROL OF LIFTING OPERATIONS

Duties of appointed person

- Assess the work to be done
- Ensure all tests, inspections, examinations and maintenance have been carried out
- Have the authority to carry out duties and to STOP the operation if there is likely to be danger

HIDDEN DANGERS

Hidden dangers which may result in serious accidents include:-

Demolition and Dismantling Work

Anchored Loads

Planned Lifts

CIN 074 - 9/10

SAFE WORKING LOAD (SWL)

SWL must not be exceeded

Lifts near to SWL:-

a) load raised short distance

b) operation stopped and stability checked

c) safety checked

LOADS

Must be:

Correctly Slung

Made Secure

Clear of Obstacles

Palletised Loads Netted

Loose Materials Lifted In A Container

DUTIES OF A SLINGER

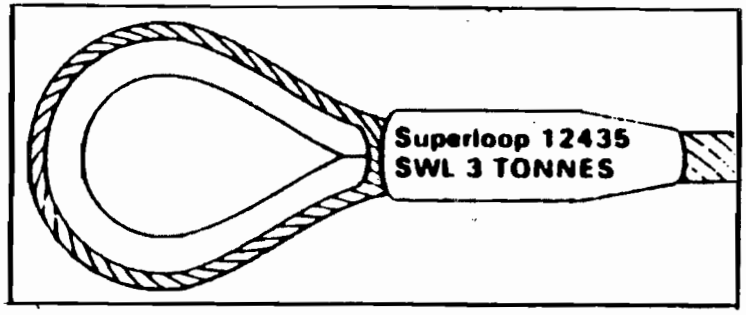
Responsible for:

- **Attaching and detaching load**
- **The use of correct lifting gear**
- **Initiating and directing safe movement of crane**

(BS 7121:Part 1:1989)

Marking

The rope, chain, sling, or other ancillary lifting gear, etc., must be clearly marked with SWL and carry an identity mark, except for rope and rope slings if this information is available from a table of safe working loads posted on the site.

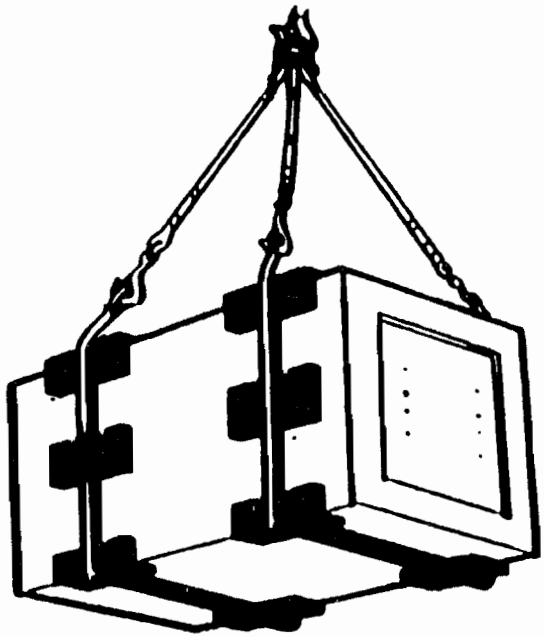


REFERENCE

Construction (LO) Ref. 34

CITB CONSTRUCTION INDUSTRY TRAINING BOARD

Preventing Damage



The edges and corners of a load should be packed to prevent sharp edges damaging lifting ropes, chains, slings, etc.

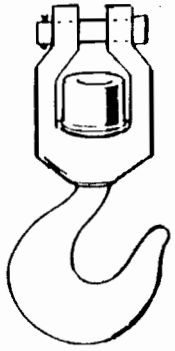
REFERENCE

Construction (LO) Ref. 38

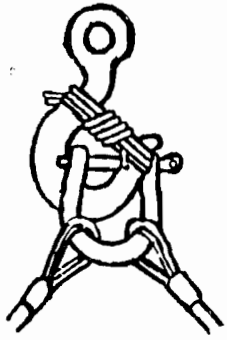
CIN 074 - 9/17

Hooks

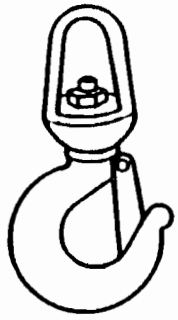
All hooks used for lifting must be fitted with a safety catch, or should be moused, or so shaped as to prevent the sling eye or load coming off the hook



Open top swivel hook



Moused hook



Hook with spring loaded safety catch

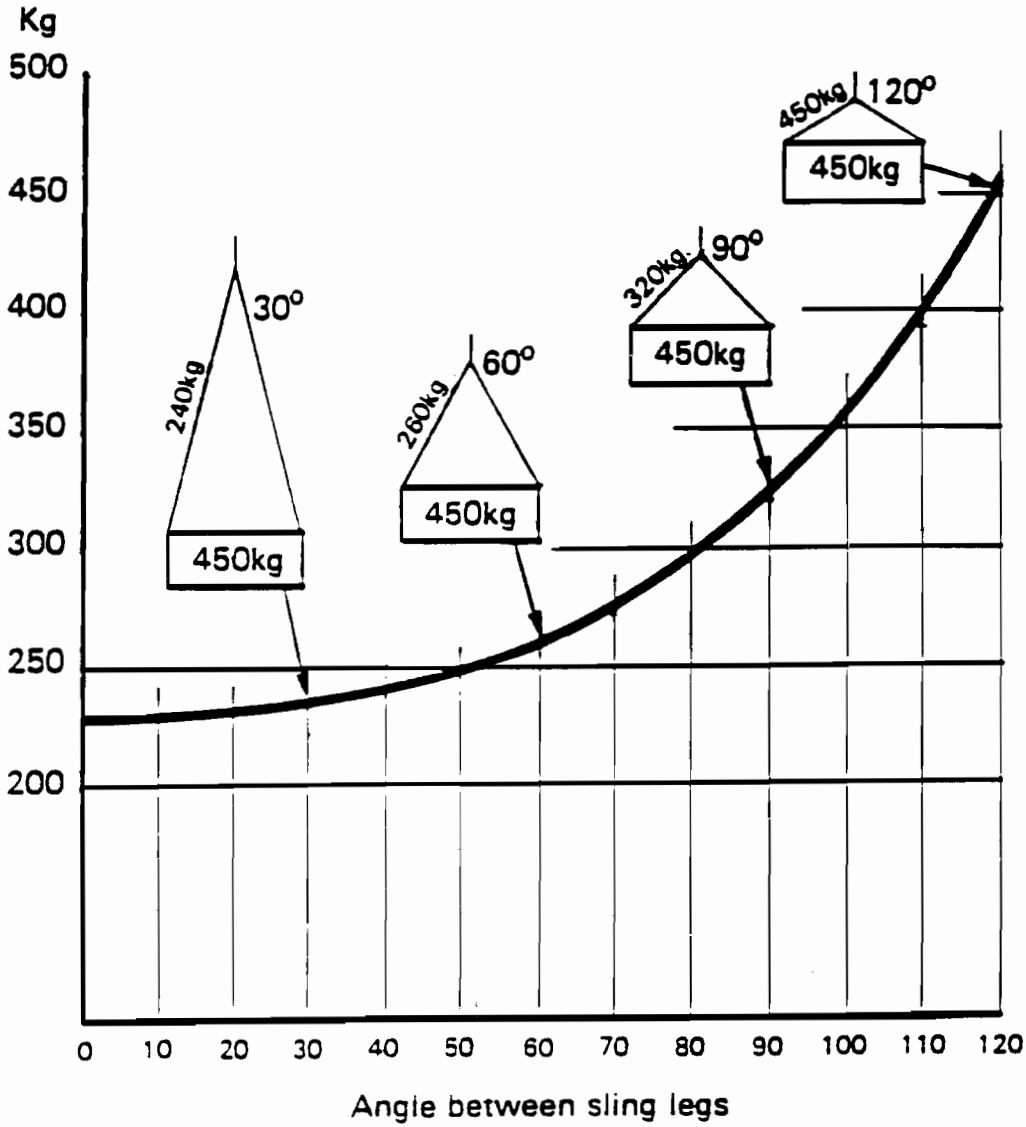
'C' hook with link

REFERENCE

Construction (LO) Ref. 36

CITB CONSTRUCTION INDUSTRY TRAINING BOARD

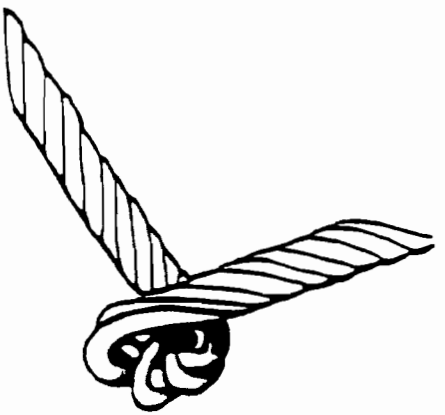
CIN 074 - 9/18

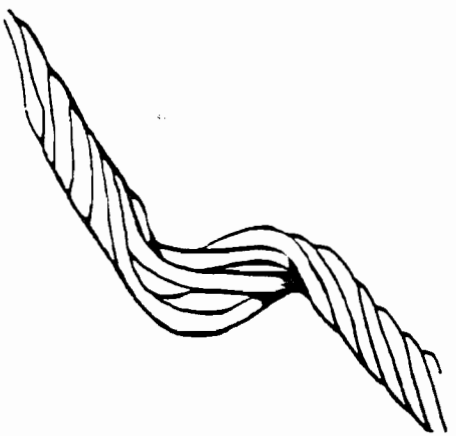


How load in each sling leg increases as angle between sling legs is increased. Refer to manufacturer's SWL tables

CIN 074 - 9/19

Kinked Wire Rope





CIN 074 - 9/20