BS 7121-1
CODE OF PRACTICE FOR SAFE USE OF CRANE
PART 1: GENERAL

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BS 7121- Lifting Operations are Carried Out Safely

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Statutory regulations:
- LCLER
- PUWER
- The Health and Safety at Work (H&S)W)
- The Supply of Machinery (Safety) Regulations
- The Construction (Design and Management) Regulations
- The Management of Health and Safety at Work Regulations (M&GW)
- Personal Protective Equipment at Work Regulations (PPEW)
- The Work at Height Regulations
- The Air Navigation Order
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)
BS 7121-1 CoP for SUoC

1. SCOPE

Recommendations for the safe use of cranes.
- Safe systems of work
- Management
- Planning
- Selection
- Erection and dismantling
- Inspection, testing, examinations
- Operation
- Maintenance
- Handling and management of LO

2. NORMATIVE REFERENCES

BS 7121 (all parts) CoP for Safe Use of Crane
BS 7671 Requirements for electrical installations IEE Wiring Regulations
BS EN 12077-2 Cranes safety. Requirements for health and safety. Limiting and indicating devices
HSE Guidance Note GS6, Avoidance of danger from overhead power lines
HSE Guidance Note HS G 141: Electrical installations on construction sites.
3. TERMS AND DEFINITIONS

<table>
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<td>LO is to be carried out</td>
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<td>Lifting</td>
<td>Movement of loads</td>
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<td>Basic lift</td>
<td>Mass of load, no hazards</td>
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<tr>
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<td>There are hazards</td>
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<td>Complex lift</td>
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<td>In-service (wind speed and manufacturer conditions)</td>
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<td>Out-of-service (no load d/hoop)</td>
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<td>Testing</td>
<td>Operation of each motion</td>
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<td>Functional testing</td>
<td>No load</td>
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<td>Non-destructive testing</td>
<td>NDT</td>
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<td>Thorough examination</td>
<td>Safe to use</td>
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<tr>
<td>Use</td>
<td>Starting, stopping, programming, setting, transporting, repairing, modifying, servicing and cleaning</td>
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<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tr>
<td>Appointed person</td>
<td>Competent person</td>
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<td>Crane coordinator (plans and directs LO)</td>
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<tr>
<td>Crane operator (position loads, crane driver)</td>
<td></td>
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<tr>
<td>Crane supervisor (control LO)</td>
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<td>Employing organization</td>
<td></td>
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<td>User (control LO and crane operator)</td>
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<td>Work equipment</td>
<td>Carrier (manider-supports persons)</td>
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<td></td>
<td>Configuration (counterweights, supports, ...)</td>
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<td></td>
<td>Control gear</td>
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<td></td>
<td>Indicator (warnings and data)</td>
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<td></td>
<td>Motion limit device</td>
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<td></td>
<td>Performance limiting device</td>
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<tr>
<td></td>
<td>Radius</td>
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<td>Rated capacity (SWL, configuration)</td>
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<td></td>
<td>Rated capacity indicator/limiter (RCI/L) Prevent form overload, ASLI</td>
</tr>
<tr>
<td></td>
<td>Lifting accessory (LE for attaching loads)</td>
</tr>
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<td></td>
<td>Lifting equipment (crane+attachments)</td>
</tr>
<tr>
<td></td>
<td>Load (weight to lift)</td>
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</table>
4. MANAGEMENT OF INSTALLATION AND LIFTING OPERATIONS

SAFE SYSTEM OF WORK
CONTROL OF THE LIFTING OPERATION
   GENERAL
   SELECTION OF APPOINTED PERSON
   OTHER PARTICULARS
DUTIES OF THE PERSON APPOINTED TO CONTROL THE LO
   GENERAL
   BASIC LIFT
   STANDARD LIFT
   COMPLEX LIFT
DUTIES OF THE PERSON INVOLVED IN CONSTRUCTION PROJECTS
SAFE SYSTEM OF WORK include:
- Planning of the operation
- Selection, provision and use crane and work equipment
- Any necessary preparation of the site, erection & dismantling
- Maintenance, examination – crane and equipment
- Training - HSW responsibilities
- Supervision by trained and competent personnel
- Reports of thorough examination and other documents available
- Preventing unauthorized movement
- Safety of person not involved

COMMUNICATION – ALL PARTIES - CLEARLY

CONTROL OF THE LIFTING OPERATION
GENERAL - one person have overall control of LO
SELECTION OF APPOINTED PERSON – variety and complexity of the operation, hazards and environmental causes
OTHER PARTICULARS - collision between cranes and other equipment - crane coordinator should plan crane movements

DUTIES OF THE PERSON APPOINTED TO CONTROL THE LIFTING OPERATION
- Familiar with H&S Plan
- Assessing LO (planning, selection of crane, lifting accessories and equipment, instruction and supervision, consultation)
- Ensuring – inspection/examination and maintenance of equipment
- Ensuring - procedures for reporting defects and incidents - corrective action
- Control LO
- Ensuring Crane Supervisor know the method statement
4. MANAGEMENT OF INSTALLATION AND LIFTING OPERATIONS

DUTIES OF THE PERSON APPOINTED TO CONTROL THE LIFTING OPERATION

**BASIC LIFT**
- Weight of the load and no hazards, duties of appointed person include:
  - Weighing the load or calculation (from water + forces)
  - Selection crane (weight-hook-lifting tackle-load, max height, max radio)
  - Access and egress, and the suitability of the ground
  - Wind speeds - instruction manual of the crane
  - Thoroughly examined (6 months Lifting Person, 12 months) before use
  - System for reporting defects is in place
  - Selecting lifting accessories, method of attachment and protection
  - Lifting accessories are thoroughly examined 6 months before use
  - Designating person to check lifting accessories and lifting points (load)
  - Briefing all person involved in LO
  - Checking: numerous load - no changes required
  - Ensuring the crane supervisor-operation-method statement

**STANDARD LIFT**
- Investigating all hazards in the operating area
- Increased risk if load is lifted from structure at a height above the crane (deflections)
- Liaison persons or authority-corrective action or special measures
- Effect of LO properly or persons to minimize any adverse effects

**COMPLEX LIFT**
- Exceptional hazards (chemical plan, demolitions, load wind)
  - Weight of the load and position CG
  - Wind area of the load, and wind speed limit
  - Lifting points on the load - adequate
  - Method of statement (access, ground condition, erection,..)
  - Person being lifted (Annex A)
DUTIES OF THE PERSON INVOLVED IN CONSTRUCTION PROJECTS

The Construction (Design and Management) (CDM) Regulations require that designers, planning supervisors, principal contractors, subcontractors and clients consider H&S matters in all stages of construction projects.

LO should include H&S Plan required by the CDM
Plan include information to all parties, specifications, installation, use to ensure LO in safe manner
Site and type(s) of crane to be used
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5. CONTRACT LIFT OR CRANE HIRE

**EMPLYING ORGANISATION**
The Organisation requiring the load to be moved

<table>
<thead>
<tr>
<th>HIRED CRANE (Hired and Managed)</th>
<th>CONTRACT LIFT (Fully Contracted)</th>
</tr>
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<tbody>
<tr>
<td>The Employing Organisation must:</td>
<td>The Employing Organisation should specify:</td>
</tr>
<tr>
<td>Carry out all work in accordance with BS 7121</td>
<td>That all work is to be undertaken in accordance with BS 7121</td>
</tr>
<tr>
<td>Supply the Appointed Person</td>
<td>That the Contractor is to supply the Appointed Person</td>
</tr>
<tr>
<td>Plan the lift and operate a safe system of work</td>
<td>What information and/or services that will be provided to the Contractor by the Employing Organisation</td>
</tr>
<tr>
<td>Check the credentials of the crane hire company and certification supplied</td>
<td></td>
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<table>
<thead>
<tr>
<th>The Crane Owner has a duty to:</th>
<th>The Contractor is responsible for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a crane that is properly maintained, tested and certificated</td>
<td>Supplying the Appointed Person</td>
</tr>
<tr>
<td>Provide a competent operator</td>
<td>Planning the lift and operating a safe system of work</td>
</tr>
<tr>
<td>Organisation and control of the Lifting Operation</td>
<td></td>
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</tbody>
</table>

**GENERAL**
Hired crane or employing a contractor (Contract Lift)

**CONTRACT LIFTING OPERATIONS**
All work is carried out – BS 7121
The contractor appoints a person control LO
All information or service comply BS 7121

**USER’S DUTIES WHEN USING HIRED CRANES**
A crane with an operator-owner provide competent person and crane properly maintained, inspected and tested.
The user-responsibility for appointed person, ground conditions, selection crane, planning operation (crane operator)
GENERAL
- Load, method of lifting (attention - water)
- Selection of crane appropriate
- Selection of accessories for lifting (+load crane)
- Position of the crane and load (before, during and after)
- Site operation hazards, space, ground
- Any necessary erection or dismantling of the crane
- Environmental conditions

RISK ASSESSMENT
Planning process a risk assessment by the appointed person to identify hazards with the LO
Generic and specific risk assessments. The result should be recorded in writing-method statement
Risk assessments + manufacturer’s instructions - use to develop a detailed method statement.
SAFE - transportation, assembly, erection, use and dismantling

METHOD STATEMENTS include
- Tasks and configuration of the crane at the end each day
- Eliminate danger to personnel not involved in LO (closures if necessary)
- Pre-use checks
- Allocation of tasks

LO under control of crane supervisor.
Copy to all involved in LO - clear roles, communication.
1. SELECTION OF PERSONNEL
   Competent, trained and experienced persons
   Efficiently organized to ensure good team-work
   NO alcohol, drugs or other influences.

2. DUTIES OF PERSONNEL
   1. **CRANE SUPERVISOR** LO is carried out with the Method statement
   2. **CRANE COORDINATOR** Plan and direct the sequence of operations
      Ensure no collide with cranes, load, equipment
   3. **CRANE OPERATOR** Correct operation. Respond to the signals. Stop.
   4. **SLINGER** Attaching and detaching the load. Use the correct accessories.
      Initiating and directing movement. Give signals to crane operator. Audio or visual
   5. **SIGNALLER** Signal from the slinger to the crane operator. Move
      crane & load instead of slinger
   6. **CRANE ERECTOR** Working on the erection of crane-instructions
   7. **MAINTENANCE PERSONNEL** Resopible for maintaining crane – safe
      operation. Maintenance manual.
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8. MINIMUM ATTRIBUTES OF PERSONNEL

GENERAL — competent, trained, record of training and assessment, physically able

CRANE SUPERVISOR: authorized conversant all persons involved, give clear instructions, to assess danger, halt operation—risk unacceptable (crane operator)

CRANE COORDINATOR +18 years, fit (eyesight, hearing, reflexes and agility) precise and clear verbal instructions

CRANE OPERATOR +16, fit (eyesight, hearing, reflexes), physically able to operate crane, able to judge distances, heights and clearances, trained (type of crane); conversant signaler and signaller, know code on signals, trained in use of fire extinguishing/fighting equipment on the crane, trained in use escape of emergency, authorized. (Medically fit-5 yearly intervals)

SLINGER +18, fit (eyesight, hearing, reflexes and agility), physically able to handle accessories, able to establish weights, balance load and distances, heights and clearances. Trained, selecting accessories. Trained in signal code. Precise and clear verbal instructions-audio. Initiating and directing movement crane and load. Authorized


CRANE ERECTOR +18, fit (eyesight, hearing, reflexes and agility), physically able to handle the load involved in crane erection. Able to work at heights, to establish weights, balance load, distances, heights and clearances. Trained slinging, Selecting lifting gear. Trained erection, dismantling. Assess equipment to assembly. Trained set and test safety devices fitted to the crane.

MAINTENANCE PERSONNEL. Instructed and trained. Manufacturer’s instruction manual. Familiar with safe system of work and their personal protective equipment and using it
9. SELECTION OF CRANES

Points to be taken into account:

- Weight, dimensions and characteristics of loads
- Operational speed, radii, heights, areas of movement
- Number, frequency and types of LO
- Length of time (crane is required)
- Remaining life expectancy
- Site, ground and environmental conditions
- Space available, access, erection, travelling, operation and dismantling
- Any special operational requirements or limitations imposed

In selecting the right crane for the job, consider the following points:

1. What is the maximum radius from the centre of slew?
2. What will be the total weight of the load?
3. Is clearance height under ceiling (if any) an issue?
4. Allow for distance from job head to the hook.
5. Allow for the hook height required with associated lifting equipment.
6. Allow for the height of obstructions between crane and load.
7. Allow for obstructions which may hinder the counterweight when slewing.
8. Allow for obstructions the crane may need to work around when setting up.
9. Consider what boom length will be required.
10. Ensure the ground can support the crane.
11. Allow for how the crane will access and leave the site.
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10. SAFETY

GENERAL  Safety in LO include USE, MAINTENANCE, REPAIR, RENAWAL of safety equipment and instruction.

MODIFICATIONS AND MATERIALS  Any part of crane (structure, control systems) written approval of engineer or manufacturer. Replace, repair, welding, nuts, bolts, high strength friction grip bolts with the manufacturer’s specification.

WIND LOADING-  CIRIA G954 & BS2573:1 Forces by winds in-service (14m/s) and out-of service (47-52 m/s).

IDENTIFICATION OF PERSON DIRECTING CRANE MOVEMENTS (slinger or signaler) Easily identifiable, wearing high visibility clothing or by using radio call signs.

PERSONAL SAFETY EQUIPMENT-appropriate for the conditions (helmets, safety spectacles, boots, ear defenders, fall protection equipment).

USE OF PERSONAL PROTECTIVE EQUIPMENT – Personnel are instructed in the correct use of PPE.

ACCESS AND EMERGENCY ESCAPE

GENERAL- All access ways should be kept clear of obstructions and other hazards.

BOARDING AND LEAVING THE CRANE- With the operator’s permission, instructed access and emergency escape.

FIRE EXTINGUISHERS- Risk assessment and adequately trained.

LIMITING AND INDICATING DEVICES FOR CRANE SAFETY EQUIPMENT

GENERAL- Maintained in good working order, manufacturers instructions.

LEVEL INDICATORS AND INCLINOMETERS-used and maintenance in accordance manual.

WIND-SPEED INDICATING AND MONITORING DEVICES- anemometers, Clear view.

WORKING SPACE LIMITER (ZONING DEVICE)

ANTI-COLLISION DEVICES

MACHINERY GUARDING
1. **RATED CAPACITY CHARTS** - Understandable rated capacity in specified operating conditions of the crane (de-rating for special applications)

2. **INSTRUCTION MANUALS** - In the appropriate language, information on the erection, use, alteration and dismantling of the crane.

3. **REPORTS OF THOROUGH EXAMINATION/TEST CERTIFICATES** - Should be kept on site or with the crane.

4. **RECORDS** - Clearly identifiable with the crane. Include:
   - Technical information, maintenance instructions and performance by manufacturer
   - Reports thorough examination, test, inspectors...
   - Repairs and modifications to the crane (signatures of responsible persons)
   - Details of occurrences, relevances
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12. SITING OF CRANES

GENERAL: Crane standing and support conditions/hazards/wind/access (erection, working, dismantling)

CRANE STANDING OR SUPPORT CONDITIONS (imposed by the crane)
The loadings should include the effects of:
- Dead weight of the crane/of the load/accessory of lifting
- Dynamic forces caused by movements of the crane
- Wind loading
- In-service or cut-of-service

PROXIMITY HAZARDS

GENERAL: Electric lines, underground services. Crane 600 mm clearance any obstacle. Good stacked; boundary lines marked

OVERHEAD ELECTRIC LINES AND CABLES: If machine contact with electric line
- Remain inside cab
- Warn all keep away from the crane, load, any part
- Confirm conditions are safe; electricity supply
- Jump far away from the crane, Do not touch the crane and ground at the same time
- Inform the responsible engineer or authority concerned

CRANE CONTROL IN THE VICINITY OF AERODROMES/AIRFIELDS
If its height exceeds 10 m, shall consult the aerodrome manager or permission
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13. ERECTION AND DISMANTLING

PLANNING
- Should be thoroughly planned and supervised. To ensure:
  - Erection/instruction manual is available
  - Erection/dismantling manual for particular crane
  - Operations is controlled by the erector in charge
  - Personnel involved have a sound knowledge of the operation
  - Any departure from prescribed procedure? approved engineer
  - Correct parts and components are used when replacement
  - Method of moving crane from the place of erection to its place of work.
  - Crane is level to within the limits specified by manufacturer
  - Safe means of access is provided

MANUFACTURER'S ERECTION AND DISMANTLING INSTRUCTIONS
- Should be closely followed. Manuals sometime deal with dismantling procedures by
  the simple statement that they are the reverse of erection procedures

IDENTIFICATION OF COMPONENTS AND MATERIALS

COMPONENTS
- Clear identification mark (transportation). Correct location and orientation. Avoid a mismatch of fasteners

MATERIALS
- Nuts, bolts, high strength friction grip bolts and nuts, hardened steel washers for shear connection (not be re-used once) should be marked.

ELECTRICAL SUPPLY if the crane is electrically operated from a source external to the crane:
- Have an effective earth connection (Crane structure, motor, all electrical equipment)
- Power supply and crane checked for compatibility before connection
- Cables should be protected from mechanical damage
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14. PROCEDURES AND PRECAUTIONS

CRANE OPERATION
Move, lifting load, maintenance- competent operator

WORKING ON CRANES

GENERAL
To work on cranes for inspection, maintenance and other reason to ensure they are not endangered by movement of the crane, and a safe working place and access are provided.

PERMIT TO WORK
Safe precautions necessary to achieve the safe system of work.
Sign the document noting responsible for the work and the personnel associated. Include:
- Allocation of responsibilities for coordinating, monitoring, issuing, receiving, clearing and cancelling permits to work
- Clear identification of crane
- Effective isolation and safe from all sources of danger
- Secure key, fuses or devices essential for isolation
- De-energization safe working area

PERIODIC CHECKS ensure pre-use checks and in-service inspections are carried out.

CRANE NOT IN REGULAR USE—For an extended period of time the user ensure programme of pre-use checks:—

REPORTING OF DEFECTS AND INCIDENTS—The procedure should include notification to the appointed person, recording of action taken to rectify any defect and clearance of the crane.

Should include:- Any defect found during daily checks, any time incidents or accidents, shock loads, dangerous occurrences or reportable accidents. After any incident- examination by a competent person.

LEAVING THE CRANE UNATTENDED—Operator is present when a load is suspended. It is essential:
- All loads have been removed in a safe position
- Power supplies switch off
- Machine in a safe condition—brakes and locks
15. MAINTENANCE

GENERAL Crane and LE maintain in satisfactory condition.

PLANNED MAINTENANCE
Manufacturers' instruction manuals (lubrications, electrical, fixing bolts, torque setting, clutches and brakes,...)
LOLER requires a competent person to assess.
Depends on use of the crane and the environmental conditions
Calibration of a crane's RCLL
A record should be kept!

REPLACEMENT COMPONENTS in accordance with the manufacturers' specification

USE OF SPECIAL MATERIALS IN CRANE CONSTRUCTION
Repairs high tensile steel in modern cranes correct procedure laid down by the manufacturer, to avoid changing the properties of the materials
16. OPERATING CONDITIONS

RATED CAPACITY

- Only be exceeded - testing under supervision
- Prevent pendulum swinging of the load-control motions
- Hoisting, slewing, traversing, luffing or travelling motions not to drag loads (always vertical position-hoist line)- structural failure

MODE OF OPERATION AND CONTROL

GENERAL - Control marked, symbols (direction of movement). No tamper any control, or equipment. Operator should be trained and deemed competent on the particular crane, clear view of load or slinger-signalier, no causing damage, signal clearly heard.
- Hoist line be vertical, balance load, avoid chock and side loadings, light and ball or klaxon-travelling cranes - person

REMOTE-CONTROLLED CRANES
- Retain the transmitter in physical possession or remove the key, or storage
- Belt or harness-operator transmitter switched on and off
- Test the controlled-range feature at regular intervals.

HANDLING OF LOAD NEAR PERSONS
- Extreme care. Route of load planned, prevent lifting over persons.
- Highways, railways, rivers, other places public have access should be avoided.

LIFTING REGULATIONS
GENERAL- 2 or + cranes. Planning and supervision, accurate assessment of the proportion of the load to be carried by each crane. Hoist ropes remain vertical.

MAIN FACTORS TO BE CONSIDERED WHEN PLANNING MULTIPLE LIFTING

WEIGHT OF THE LOAD and its distributions calculated
CENTRE OF GRAVITY - not be known accurately
WEIGHT OF THE LIFTING ACCESSORIES/ATTACHMENTS - part of the calculated load on the crane.
CAPACITIES OF THE LIFTING ACCESORIES/ATTACHMENTS - variation in distribution
SYNCHRONIZATION OF CRANE MOTIONS - the effect of variation in plumb of hoist ropes - inequalities of speed.
INSTRUMENTATION - monitor angle of load and verticality, motion speeds
SUPERVISION - only this person give instructions
RECOMMENDED RATED CAPACITY DURING MULTIPLE LIFTING - all factors accurately evaluated and down-rating apply 20% or more.
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18. WEATHER CONDITIONS

GENERAL - Electric storms, strong wind, heavy rains, ice or snow can imposed loads on a crane or affect the safety of LO

WIND

WIND SPEED INDICATION - anemometer

VISIBILITY - communication

RAIN, SNOW/ICE

SEA STATE - vessel stability
WEIGHT AND CENTRE OF GRAVITY OF THE LOAD

WEIGHT OF THE LOAD
To know accuracy, Procedures to determinate the weight.
- It is marked on the load (all parts of the load)
- In any documentation
- Use a weighbridge (trailer, truck)
- Estimate weight

CENTRE OF GRAVITY

GENERAL the total weight of the load is concentrated
REGULARLY SHAPED LOAD(S) CG can be easily judged
MOVE COMPLEX-SHAPED LOADS OR IRREGULARLY SHAPED LOADS estimate

USE OF LIFTING ACCESSORIES/ATTACHMENTS
Valid report or thorough examination (6 months)
Stored in secure dry conditions (tangled/wet/dirt/grease/concrete)
Protected from mechanical damage, heat, cold, corrosive substances
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20. SIGNALLING SYSTEMS

Hand signal, radio telephone....forms of communication a thorough examination after installation
21. THOROUGH EXAMINATION INCLUDING TESTING

GENERAL - BS 7121-2 gives guidance

RESPONSIBILITIES OF THE CRANE USER

GENERAL - crane is out of use for the period of time required

PROVISION OF FACILITIES AND SERVICES
- Appropriate area, cordoned
- Operator for the crane
- Remove covers or open up parts of the crane
- Preparation of parts or areas of the crane for NDT

PROVISION OF INFORMATION: rated capacities, alterations, repairs, renewals, operators' instructions. Report a thorough after installation, where appropriate and retained
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22. ROPES

1. ROPE REPLACEMENT - size, type, strength and construction - manufacturer's handbook
2. ROPE LENGTH - at least 2 turns of rope left on the drum, drum flanges at least 2 rope diameters beyond the outer layer of the rope
3. OFFLOADING, STORAGE, UNCOILING AND HANDLING, INSTALLATION AND RUNNING IN

OFFLOADING - with care
STORAGE - cool, dry, no contact floor. Examined regularly. ~30 m ropes stored on a reel
UNCOILING AND HANDLING

GENERAL - no slack, use tautable. Any rope is cut the manufacturer's instructions
MULTI-STRAND ROPES - they are installed without imparting any rotation to the rope
INSTALLING AND TRANSFERRING ROPE FROM REEL TO REEL, DRUM
RUNNING IN - adjust to the working conditions
4. ROLLERS AND GUIDES SHEAVES - To ensure the rope does not rub against the jig. Damage to a rope, regular checks roller and sheaves - free to rotate.

5. ROPE DRUMS AND SHEAVES (sheaves ferrous or plastic materials)

6. ROPE TERMINATIONS
   GENERAL - anchorage points are securely fastened
   WEDGE AND SOCKET TERMINATIONS FOR ROPES
   ASSEMBLY - correct dimensions and strength termination - securing method used
   INSPECTION - rope damage, condition socket, wedge, deformation or defect

7. MAINTENANCE
   GENERAL - Cleaning and application of dressings (lubrication - protection against corrosion)
   FREQUENCY OF DRESSING - depends on the installation and on environment.
   APPLICATION OF DRESSING - brushing, spraying, dripfeed, or automatic application

8. ASSESSMENT OF ROPE CONDITION AND DISCARD CRITERIA - BS7121-2 (Clause 12)
23. SPECIAL APPLICATIONS OF CRANES

RAISING OR LOWERING OF PERSONNEL
1. GENERAL - designed for this purpose, careful planning
2. CARRIER depend on the application - construction, forestry, rescue
3. COMPATIBILITY OF CARRIER AND CRANE
   CAPACITY - at least twice the minimum rated capacity
   MOTION CONTROL SYSTEM - smooth transition, working speed max 0.5 m/s on all motion
   ROPES - minimum diameter of 8 mm
   HOOK - with safety catch

4. THOROUGH EXAMINATION AND PRE-USE CHECKS (BS 7121:2 clause 11)
5. OTHER DEVICES/FACILITIES
   ANEMOMETER - to monitor in-service wind speeds
   STORAGE - including emergency egress equipment in carrier
   RATED CAPACITY LIMITER/RATED CAPACITY INDICATOR
   To prevent over-hoisting, over-lowering or over-derrick. Check daily. Ensure sufficient rope is fitted to each operation.
23. SPECIAL APPLICATIONS OF CRANES

6. OPERATION

6.1 ORGANIZATIONAL REQUIREMENTS
Visual and audible communication all the times.
Trained and perform in any emergency recovery procedure, operator and signaler only this
operation, machines not operate simultaneous in the same place collision, all movement
0.5 m/s.
Carrier not be used:
- wind exceeding 7m/s (25km/h) - Anemometer
- electrical storms
- snow or ice, fog, sleet,
other weather conditions could affect the safety of personnel
Crane inspected every working day.

6.2 PRECAUTIONS FOR PERSONS IN THE CARRIER
Harnesses:

WORK FROM CARRIER — electrical hazard, electric arc welding. Complete
insulation of the crane hoist rope.

OTHER SPECIAL APPLICATIONS — guidance on other special application
- Grabbing and magnet crane services — BS 7121-3/12.6.2
- Vacuum lifting devices BS 7121-3/12.6.3
- Piling operation — BS 7121-3/Annex A
- Demolition and balling operation BS 7121-3/Annex B
- Dismantling operation BS 7121-3/Annex C
- Dynamic compaction BS 7121-3/Annex A
BS 7121- 1 CoP for SUoC

ANNEX A- TRAINING OF CRANE OPERATOR AND SLINGERS

A.1 GENERAL- employment of competent, trained operators and slingers- safe use of cranes

A.2 EMPLOYERS' DUTIES- use appropriate aprocedures to ensure the potential trainees are
selected, basic training in the principles of crane driving and slinging, train employees in the
particular equipment, only authorized employees are competent, adequate supervision (refresher
training assessed)

A.3 MACHINE SPECIFIC TRAINING

GENERAL- knowledge and expertise required by the operator- type of crane
APPROPRIATE TRAINING- hazards, complexity of crane, work locations
SLINGER TRAINING- trained in safe lifting practices for possibly varying types of load
INSTRUCTORS- see A.10 Training depend on effectiveness of the instructors

A.4 SELECTION OF OPERATORS AND SLINGERS

GENERAL- by employer- selection test may used as part of the process.
SELECTION CRITERIA- Person should be reliable, with ability to work in a responsible
and safe manner. (driving licence- mobile crane) at least 18. A reasonable level of
mathematical and mechanical aptitude (load chart, estimate or calculate load, assess
angles, use charts). Fit to do the job, physically and mentally.

ASSESSMENT OF TRAINING NEEDS

Check qualifications and experience
A.5 Basic Training of Operators

**General** - covers the principles, theoretical and practical safe operation - type of crane

**Training Venue**

**Crane Used for Training** - similar characteristics to the type use after training. In good conditions

**Training Area Access** - restricted to the instructor and trainees

** Appropriateness of Training** - practice in the range of loads and conditions, hazards in normal operation. Sort if work the trainee is to be doing

**Facilities and Training Aids**

**Course Duration** - largely practical, to master the necessary skills

**Course Structure** - programme time for learning and practice. Simple tasks, to complex operations. Training in safe operation

**Multiple Crane Types** - give for each type, cater for the differences between types of crane

**Trainee/Instructor Ratio** - particular aspect of training, sufficient time for the instructor to demonstrate each part to the practical training, each trainee to practice the skills - individual approach
A.6 THE TRAINING PROGRAMME

**GENERAL**  Type crane – minimum training programme

**THEOREICAL TOPICS**  Introduction; syllabus, relevant legal requirements (crane construction, maintenance, examination, certification, and responsibilities in LC), all main components (location, function of controls, instruments, indicators, and safety devices), mechanical, hydraulic, pneumatic and electrical systems to safe operation of crane.

Routine inspection, reporting, maintenance, erection and dismantling – manufacturer’s instruction. Limitation on the uses (strength, stability, ground conditions, distribution of the load, outrigger, shock, wind. Assessment load (weights and CG and their stability). Good operating practices (near other cranes, overhead lines, multiple lifting) Signalling methods-manual signals. Maintenance – records


**TRAINING IN SLINGING**  operators are likely to be acting as the slinger
ANNEX A- TRAINING OF CRANE OPERATOR AND SLINGERS

A7. ADVANCED TRAINING FOR OPERATORS
   GENERAL Instruction and control of the specific crane, and special load. Inspection.
   TRAINING VENUE AND COURSE CONTENT

A8. TRAINING OF SLINGERS
   GENERAL Principles or care, maintenance, selection and use of lifting accessories
   TRAINING FOCUS Trainer and instructor be solely concerned with that training
   TRAINING EQUIPMENT-e good range and in good condition and sale
   TRAINING FACILITIES-theoretical parts and practically based
   COURSE DURATION sufficient to cover the subject adequately and to allow time for practical
   COURSE CONTENT

THEORETICAL TOPICS
   Introduction syllabus
   Legal requirements
   Types of lifting accessories, their functions, limitations and failure
   Routine care, inspection, maintenance and report of defects.
   Assessment of loads (weights and CG)
   Selection, correct use and practice of LA. methods of
   rating LA any particular conditions
   Singnalling methods- manual signals
   Record keeping

PRACTICAL TOPICS
   Practical work on selecting accessories for particular loads
   Giving appropriate signals to a crane operator
   Particular hazards or situations- to meet in the normal job
ANNEX A - TRAINING OF CRANE OPERATOR AND SLINGERS

A9. APPRAISAL AND AUTHORIZATION

GENERAL - Assessment of trainees' progress at each stage
CRANE OPERATOR'S TEST - at the end of the training programme (partly written)
- Routine maintenance, safety checks and inspections and records
- Proper siting of the crane and use of out-riggers
- Erecting and dismantling
- Use and testing of safety devices
- Handling different load in a variety of conditions, appropriate crane configurations
- Use of correct and adequate signalling techniques
- Description of emergency procedures

SLINGER'S TEST - confirms their ability to perform their duties

TRAINING RECORDS AND CERTIFICATION - keep

AUTHORIZATION OF EMPLOYEES - simple to operate, authorization need not be in writing

CONTINUING ASSESSMENT

A10. SELECTION AND TRAINING OF INSTRUCTORS

GENERAL

PREVIOUS EXPERIENCE

INSTRUCTOR QUALITIES - motivation to be an instructor & the ability to communicate effectively.
- To lead and control, and be responsive to the varying needs of different trainees

INSTRUCTOR TRAINING COURSE CONTENT

- Principles of instruction, classroom techniques and practice demonstration techniques
- Assessment and analyses of work activities
- Course design, training specification
- Design, construction and use of practical test to assess trainees' performance

ASSESSMENT AND CERTIFICATION
BACKGROUND TO THE BS 7121 SERIES

This code aims to:
- Describe principal characteristic of cranes (types, forms, used)
- The more common hazards in their use
- Recommendations and precautions to avoid accidents
- Implement legislation

The systems require adequate planning, management and supervision, training of personnel, and clear instructions.

Safe working practices

This code of practice have been prepared by Committees of representative from different branches of crane industries, HSE, crane design, manufacturer.