

Planning to Lift



Planning lifting operations is internationally and industry accepted as the most effective tool for producing safe lifting operations.

This is reflected in UK Regulations (LOLER), which require every employer to ensure that every lifting operation involving lifting equipment is properly planned by a Competent Person (CP) / Appointed Person (AP).

In the US, the technical standard (P30.1) on planning lifting operations was produced with the intention of preventing or minimising injury to people, and otherwise providing for the protection of life, limb and property, by offering guidance for planning efforts that enhance the safety of load handling activities.

Every lifting operation must also be risk assessed by a CP / AP. To simplify production it can help to divide it into three sections; generic, specific and human factors.

- Generic hazards, such as dropped objects, slips, trips, falls, etc. are common to all lifting operations and therefore their controls should always be in place
- The lifting operation should then be divided into a sequence of steps, with the hazards in each step identified and then the specific controls / mitigation determined and implemented
- Human influencing factors, such as workload, peer pressure, fatigue, stress, risk perception, etc. that can affect behaviour should also be considered for each element of the lift performed by personnel. Controls, if required, should then be implemented to prevent / mitigate the factors that can contribute to / cause an incident or accident

Individual roles should then be identified and made responsible for implementing and monitoring each control / mitigation measure.

Lift planning and risk assessment are elements within the safe system of work construct - People, Plant, Process and Performance. When they are properly developed, implemented and work together as a single entity with the other elements, such as compliant behaviour, safe lifting operations can be achieved.

Alongside the lift planning guidance in this document, where applicable, there are useful references to Regulations, standards, industry best practice guides and subjects, which a competent person responsible for planning lifting operations should be familiar with. This is in addition to fully understanding the requirements in their company lifting policy, processes and procedures.

Reference:

- UK Lifting Operations and Lifting Equipment Regulations (LOLER)
- LOLER, Approved Code of Practice and Guidance
- American Society of Mechanical Engineers (ASME) P30.1, Planning for Load Handling Activities
- American Petroleum Institute (API) RP 2D, Operations and Maintenance of Offshore Cranes
- BS7121-1, Code of Practice for Safe Use of Cranes - General, Planning of the Lifting Operation
- Step Change in Safety, Lifting and Mechanical Handling Guidelines
- International Association of Oil and Gas Producers (IOGP) Report 376, Lifting & Hoisting Safety Recommended Practice
- DNVGL-ST-N001, Planning and Execution of Marine Operations
- CIG 0201, Construction Plant-hire Association (CPA) Best Practice Guide - Risk Assessment and Method Statement for a Contract Lift
- ESTA, Best Practice Guide for Self-propelled Modular Transporters



A lift plan contains multiple, interconnected component parts / sections, which when assembled and combined with a risk assessment produces a safe system of work.

The parts / sections of a lift plan can include:



Lift Categorisation



Lift Plan Administration
and Description of Lift



Lift Team



Load and Lifting Points



Lifting Accessories
(Rigging)



Lifting Equipment and
Anchor Points



Additional Equipment



Lift Point, Travel and
Landing Point



Lift Area Control



Environmental
Conditions



Communications



Operational Behaviour



Step-by-Step



Drawing



Toolbox Talk



Lessons learned

1. Lift Categorisation

This is a documented process, which is used to identify the level of risk involved in a lifting operation, for the purpose of directing the CP / AP to the appropriate:

- Level of lift team training / competence
- Type of lift plan and risk assessment to use
- Level of supervision
- Level of lift plan review, approval, authorisation or endorsement

There are different category names and categorisation formats in use. Specific company categories should be referenced. Examples of category names are:

- Routine Simple or Category 1
- Non-routine Complicated or Category 2
- Non-routine Complex, Critical or Category 3

Examples of commonly used categorisation processes are:

- One format uses a column of questions, on a single page, which are aligned against three categories (Cat 1, 2 and 3). To complete the process, the CP / AP answers the questions with either a yes or a no. The first question answered yes, determines the category of the lift
- Another format has questions grouped against four categories (routine, simple, complicated and complex) spread over four pages. If all the answers to the first questionnaire (routine) are yes, then the lift is categorised as routine. If any are answered no, the CP / AP moves onto the next set of questions. The process is then repeated until a category is identified



2. Lift Plan Administration and Description of Lift

This part / section can be located at the beginning or end of a lift plan. Its purpose is document control and to identify, for example:

- Lift plan author / originator
- Lift plan number, dates and revision number
- Site name / lift location
- Category of lift
- Reference numbers for supplementary documents e.g. risk assessment, drawings, calculations, uncertified equipment approvals, contingency plan, rescue plan, etc.
- Lift plan review, approval, authorisation or endorsement



A rescue plan should be produced and implemented before lifting personnel. It should describe the equipment and immediate actions that must be taken to sustain or maintain life, in the event of an emergency. A contingency plan, which details emergency response actions, should be produced / included in the lift plan, if for example, there is a significant risk of the lifting operation being interrupted, if the load is non-returnable or if the consequences of failure are severe.

This section can also be used to record a brief description of the lifting operation and to stipulate an estimated time to complete the lift, along with the need for and duration of any breaks / rest periods.

Reference:

- BS7121-1, Code of Practice for Safe Use of Cranes, General, Lift Category & Control Measures (1)

3. Lift Team

This section should clearly identify the number of trained / competent personnel involved / required to carry out the lifting operation and their roles, for example:

- CP / AP, if the lift categorisation defines their level of supervision is required
- Person in Charge (PIC) e.g. Banksmen and Lead Riggers
- Lift Team Members (LTM) e.g. Slings and Riggers
- Equipment Operators e.g. Crane Operators, who would also be regarded as lift team members
- Supporting personnel, who are only offering technical guidance / instruction

This information can now be used to clearly identify who is authorised to be involved in the lift and within the controlled lift area.

This section can also be used to record the need for a Banksman to be clearly identifiable / distinct from other lift team members, along with who verifies lift team member qualifications.



4. Load and Lifting Points

This section should contain relevant information about the load and its lifting points, for example:

- Known or estimated load weight
- If estimated, what percentage is used / added to compensate for the estimation
- Weight of the rigging and any additional equipment e.g. mobile crane hook block, fly jib, etc.
- Percentage added for any build-up of material
- Non-returnable load factor
- Factors applied for any dynamic amplification / consequences
- Gross load weight
- GoG location and stability criteria
- Number and suitability of (certified, approved or industry accepted) lifting / slinging points
- Load integrity, contents and security
- Load dimensions
- Applicable wind loading



Reference:

- UK Management of Health and Safety at Work Regulations (MHSWR) (4)
- MHSWR, Approved Code of Practice and Guidance (4)
- National sector specific skills councils / bodies and industry owned not for profit organisation training / competence standards, such as API, CITB, Cogent, Construction Skills, ECITB, GWO, IMCA, NCCCO, NPORS, OPITO, etc. (3)
- UK Provision and Use of Work Equipment Regulations (PUWER) (3)
- PUWER, Approved Code of Practice and Guidance (3)
- BS7121-1, Code of Practice for Safe Use of Cranes - General, Effect of Wind and Down-rating (3)
- Oil and Gas UK, Best Practice for the Safe Packing and Handling of Cargo to and from Offshore Locations (3)
- Area, Volume, Material Density, Weight Factors, Centre of Gravity / Stability and Load Integrity - First Competence, Lifting Operations Handbook, Sections 6 and 7 (3)

5. Lifting Accessories (Rigging)

All lifting accessories required for the lifting operation, along with their WLL / SWL should be recorded in this section, for example:

- Eye / anchor / swivel points, along with thread size and any torque settings
- Shackles
- Slings, along with their configuration, angle of use, location if critical and any packing / protection



Packing must remain secure throughout the lift, resist damage from any sharp edge and offer a safe bearing surface for the sling. The use of white cotton rags, fire blankets, old webbing slings, etc. is unacceptable.

Where lifting accessories are assembled to form a single slinging / rigging point, they can be listed under a single designation such as SP1. This will simplify writing the step-by-step and enhance understanding e.g. connect LP1 (Lifting Point) to SP1 (Slinging Point).

6. Lifting Equipment and Anchor Points

All lifting equipment and anchor points required for the lifting operation should be recorded in this section, for example:

- Cranes, along with the lift, specific points along the travel route, if applicable, and landing radii, clearances, capacity utilisation, ground / deck bearing capacities and pressures, suitability for lifting personnel, if applicable
- Gantry cranes / overhead travelling cranes
- Winches / draw works
- Runway beams, along with beam trolleys
- Certified anchor points and their maximum angle of use
- Uncertified anchor points, along with angle of use and approval by an engineer
- Beam clamps, trolleys and powered / manual hoists
- Horizontal transport / pulling lifting equipment

Where lifting equipment and anchor points are assembled to form a single lift point, they can be listed under a single designation such as LP1. This will again simplify writing the step-by-step and enhance understanding e.g. connect LP1 to SP1.



Reference:

- UK Supply of Machinery (Safety) Regulations (SMR) (5 and 6)
- Equipment technical standards, e.g. British Standards (BS), European Norms (EN), International Standards Organisation (ISO), ASME B30 Series, API, DNVGL & National Institutes (5 and 6)
- Equipment Regulator, industry guidance and manufacturers' instructions (5 and 6)
- Strategic Forum for Construction, Good Practice Guide, Ground Conditions for Construction Plant (6)
- Construction Industry Research & Information Association (CIRIA) C703, Crane Stability on Site (6)
- HSG221, HSE, Technical Guidance on the Safe Use of Lifting Equipment Offshore (5 and 6)
- Triangle Proportions, Pythagoras, Trigonometry, Vertical Reaction Forces, Resolved Forces, Resultant Forces and Friction Coefficients - First Competence, Lifting Operations Handbook, Sections 7, 9, 10, 12, 15, 16, 17 and 20 (5 and 6)

7. Additional Equipment

This section can be used to describe and record supporting / safety equipment, for example:

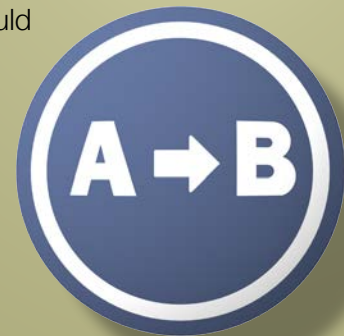
- Tag lines
- Push / pull poles
- Manual handling aids
- Securing straps
- Access / egress equipment
- Working at height equipment, etc.



8. Lift Point, Travel and Landing Point

Factors, at the lift point, along the travel route and landing point, that should be considered and recorded during lift planning are, for example:

- Ground / deck bearing capacity / pressure in relation to the load
- Underground hazards such as voids, utility supplies, etc.
- Load is free to lift
- Clearances / obstacles / snagging hazards
- Site motion / movement
- Restricted operator view / line of sight
- Power lines / hot exhaust ports
- Live plant and subsea assets
- Personnel occupied spaces (offices)
- Stability of load on landing site / dunnage / packing
- Stacking



9. Lift Area Control

This section should be used to describe and record the lift / operational area controls, for example barriers with their location and size in relation to dropped objects and equipment failure, along with policing, signage and announcements.



Reference:

- UK Manual Handling Operations Regulations (7)
- UK Working at Height Regulations (7)
- GS6, HSE, Avoiding Danger from Overhead Power Lines (8)
- Airport Operators Association (AOA), Cranes and Planes, A Guide to Procedures for Operation of Cranes in Vicinity of Aerodromes (8 and 9)
- BS7121-1, Code of Practice for Safe Use of Cranes - General, Additional Recommendations for Operation of Cranes on or Adjacent to Sites of Exceptional Hazards (8 and 9)
- Step Change in Safety, Design and Handling of Cargo Baskets (8)
- Step Change in Safety, Marine Transfer of Personnel (8 and 9)
- DROPS, Dropped Object Prevention Scheme, Recommended Practice (9)
- First Competence, Lifting Operations Handbook, Section 19 (8 and 9)

10. Environmental Conditions

Environmental limits (current and forecasted) should be considered, defined and recorded, for example:

- Visibility
- Lightning
- Heavy rain / hail / snow
- Working temperatures (minimum and maximum)
- Wind speeds (maximum)
- Sea state / significant wave height

Weather conditions such as heavy rain, extreme heat or cold, high winds, etc. can also affect concentration and therefore reduce an individual's ability to complete a task safely. Appropriate PPE will help reduce the risk of this happening.



11. Communications

This section should identify the method of communication for example radio or hand signals, along with any specific protocols, tests and restrictions / blind spots.

They should be:

- Considered / agreed during risk assessment and lift planning
- Addressed and defined during the toolbox talk
- Tested before the start of the lift



WARNING | If communications STOP, STOP lifting immediately.

12. Operational Behaviour

Specific operational behaviour, during the lifting operation, should be highlighted / recorded in the lift plan. This can include references to other documents and / or information on, for example:

- Safe / unsafe positions
- Confined / restricted spaces
- Hands free lifting tools & techniques
- Blind and hatch lifts
- Manual handling
- Working at height
- Shift handovers



Reference:

- Liebherr, Training Document, Influence of Wind on Crane Operations (10)
- Step Change in Safety, Best Practice Guide to Man-riding Safety (10)
- HSE, Reducing Error and Influencing Behaviour (12)
- First Competence, Lifting Operations Handbook, Section 19 (10, 11 and 12)

13. Step-by-step

The purpose of this section is to clearly explain the steps required to carry out the lifting operation safely, along with stipulating individual responsibilities.

In many cases a lift plan will not be used by the CP / AP but by the PIC and lift team members. It is therefore essential that instructions are clear / simple to understand and given for each and every step.

Instructions can be simplified by grouping information into steps to be completed before the lift starts, such as pre-use inspection, steps during the lift and steps completed after the lift has finished.

In addition, when lifting equipment, anchor points, lifting accessories and lifting points are grouped and recorded into single points, such as LP1, 2, 3, etc. and SP1, 2, 3, etc. step-by-step instructions will be simple to describe and enhance understanding, for example:

- Connect LP1 and LP2 to SP1
- Raise on LP1 and LP2 to a height of 200mm
- Raise on LP2 and lower on LP1 to cross-haul load to below LP2
- Disconnect LP1, etc.

14. Drawing

This section can contain drawings, photographs or graphics, if required. If added, they should NOT be used as the primary source of information but rather used in combination with the rest of the lift plan instructions to enhance understanding. If included they should indicate, for example:

- Anchor / lift points
- Travel route and landing point
- Direction of travel
- Relevant load and equipment dimensions
- Load weight and equipment weight, if applicable
- Proximity hazards
- Min / max radii
- Lift height / headroom / clearances / cross-haul angles
- Stop and assess / hold points, etc.

When reviewing technical drawings, it is important the CP / AP becomes familiar with and understands the content, for example:

- If part of the border around the drawing is missing, part of the drawing may also be missing
- The contents in the title, revision and information blocks should be reviewed
- Scale; 1:1 is actual size, whereas 100:1 or 1:100 means the actual size is 100 times that shown
- Symbols / abbreviations, for example numbers in a circle direct the reader to a more detailed view
- Section views, show a structure as though it has been sliced in half or cut along an imaginary plane

WARNING | The CP / AP should avoid producing over complicated drawings that do not add value or provide relevant / verification information. For example, 3D and multiple power point drawings can take a long time to produce and can help non-lifting personnel to understand the task, but the same level of information can be displayed in simplified line drawings, which are much easier to produce and understand.



15. Toolbox Talk

Before a lifting operation or a range of lifting operations start, a toolbox talk should be held and attended by everyone involved in the lifting operation.

Depending on the complexity of the lift, operational efficiency and the range of lifts to be completed, a toolbox talk can be delivered either daily, at shift changes or before the start of a lift. It is also recommended it is delivered at the work site, which can enhance understanding. Its purpose is to inform and prepare personnel for the lift or lifting operations, to allow supervisors or the PIC to highlight specific procedures / controls and for lift team members to ask questions / make comments. The following information should be covered during a toolbox talk:

- Description of or range of lifting operations to be completed
- Lift categorisation
- Hazards, risks and controls / mitigation
- Time available to complete lift safely
- Control of work / permit to work
- Manual handling, working at height, isolations & confined / restricted space controls
- Environmental conditions / limits
- Roles, responsibilities and identification of PIC / trainees / new personnel
- Communications (language, codes, call signs and protocols)
- Verification of equipment certification, limits and safety systems
- Equipment pre and post use inspection and suitability checks
- Barriers, policing, signage and announcements
- Load inspection and potential dropped objects
- Pick-up point, travel route and landing point inspection
- Step-by-step / method statement
- Teamwork, safe positions, line of sight, tag lines and hands free lifting
- Simultaneous / conflicting work
- Behaviour / compliance and management of change
- Equipment post-use inspection, storage and site condition
- What to do in the event of an incident and / or emergency



At the end of a toolbox talk, all attendees should be recorded and confirm understanding and agreement with the work procedure and controls by signing the toolbox talk.

WARNING | Many lifting operations are simple to perform and are repetitive. This can lead to personnel becoming complacent. The toolbox talk is therefore an essential tool for, not only delivering information but for stimulating, motivating and engaging lift team members.

16. Lessons learned

After each lifting operation any lessons learned (positive and negative) should be recorded and communicated to relevant personnel. This information is essential and will continuously improve the lifting operation every time it is carried out.

