

## Crawler Crane

*Note: It is recommended that you read the Supporting Information page before you read this factsheet.*

### Preparation and completing work *(Preparation)*

---

- Crawler cranes are travelling cranes mounted on a tracked chassis fitted with a lattice-type jib (although telescopic boom units do exist). They are capable of both slewing through 360 degrees and varying their working radius. They are also capable, in most cases, of travelling with a load and, although they tend to be operated by dedicated operators, accidents and incidents do occur, often because of the loss of stability.
- The operator must undertake pre-use checks at required intervals for the safe operation of crawler cranes. As with all plant and machinery, failure to properly check relevant crane components before work could mean that incidents or injuries occur because faults can affect both performance and safety.
- Checks and inspections that need to be made are indicated in the operator's or user's manuals for the crane. Although the frequency of checks will be determined by the manufacturer, extreme or unusual operating conditions may require more frequent checks, for example when continually lifting using long lengths of hoist rope.
- All cranes including crawlers must undergo regular thorough examinations during which all components are thoroughly examined by a nominated competent person. Although regulations suggests every 12 months, it is stated that the competent person will determine when these examinations take place as cranes used in a harsh environment or used continually near maximum capacity may need more regular thorough examinations.
- Although operators do usually undertake the daily checks, weekly-type checks that normally require more in-depth checks and adjustments should only be undertaken by the operator if they have had the additional training on the checks required for the particular model of crane.
- A requirement under legislation is the devising of a lift plan for the particular lifting operation that is to be carried out, as constructed by the lift planner/appointed person. Amongst many factors, the lift plan needs to identify all risks, the measures to be taken to mitigate these risks, the sequence of work and the number of personnel involved in the lifting operation.
- It is also important that all those involved in the lifting operation have been informed of the contents of the plan and what is required of each of them. If they notice an error or something that is not correct, they should immediately relay any concerns they have with the lift plan to the lift supervisor or appointed person/lift planner.
- Only the lift planner/appointed person is allowed to alter the lift plan if it needs amending before or during the lifting operation.
- The lift plan should identify additional external operations that may affect the lifting operation, such as nearby tower cranes, with the sequence of operations determined before lifting operations begin.
- If the crawler crane is working close to a tower crane, the sequence should be determined before work starts and on larger sites where there may be various crane operations, a crane-co-ordinator may be present who will determine the order of operations between each crane.
- When work has been completed at the end of the shift or for a break, the jib of the crawler crane must be lowered sufficiently so that there is no risk of the jib or boom striking the jib or boom of any nearby cranes. This is particularly important at the end of the shift as the jib of a tower crane must be placed into free slew, and will weather vane (be moved by the wind direction).
- In the majority of cases when crawler cranes are used for lifting operations within the construction sector, they are transported to site as separate loads and rigged or re-constructed at the site. This is usually undertaken at a different location from where the lifting operation is to take place.
- Once the crane has been rigged and before it goes to the place of lift, or even from one lifting place to another, the travel route must be clear of all hazards, other vehicles and personnel.

# CPCS RENEWAL TEST FACTSHEET

- When accessing the place of lift, all members of the lifting team need to identify any hazards or obstructions and inform the site manager. It is they, and not the lift planner, who remains responsible for ensuring that there is clear and unrestricted access to the place of lift.

## Lifting practices and working with others *(Working tasks)*

---

- Lifts should not only be planned but the crane must also be kept within the rated lifting capacity for the relevant configuration e.g. radius, height and boom/jib length. The crane's rated capacity indicator (RCI) provides warnings to the operator and others nearby when the crane both approaches and exceeds maximum rated capacity for the configuration.
- Some RCIs can be overridden but this is purely for diagnostic and testing purposes during the maintenance programme and RCIs must never be overridden during lifting operations, otherwise the crane may over-lift and risk overturning.
- Crawler cranes are designed to lift a load vertically. This means that the hook of the crane must be placed directly above the centre of gravity for the load, not the centre of the load. Depending on the load, the measured centre of the load and the centre of gravity of the load (the point that it is in balance) is not always at the same place.
- If the hook is offset to the centre of gravity of the load, it can drag along the ground when it is at the point of lift and an overload situation can occur if the load snags whilst being dragged.
- The rated capacity of a crane only applies to a freely suspended load, and does not apply at all times or for all situations. For example, if a load is still attached to a structure, vehicle etc. or embedded in the ground, the increased resistance when being lifted can overload the crane.
- Personnel can be lifted in a specially designed personnel carrier providing a method statement is undertaken relating to the lifting of persons. This would include additional considerations such as six-monthly checks and a plan for evacuation at height in case of emergencies or crane malfunction.
- Lifting operations occur in a variety of places, including near or next to areas with public access. The area of lift and the area of placing the load must be segregated from nearby pedestrians. This also applies to a site where non-lifting personnel such as other workers must be kept clear of the lifting and landing areas.
- Lifting guidance states that wherever possible, the moving of a suspended load above other workers or pedestrians should firstly be avoided. Only where this is not possible can other measures such as netting around a load or additional securing or protection features then be considered.

## Working safely and at height *(Working at height)*

---

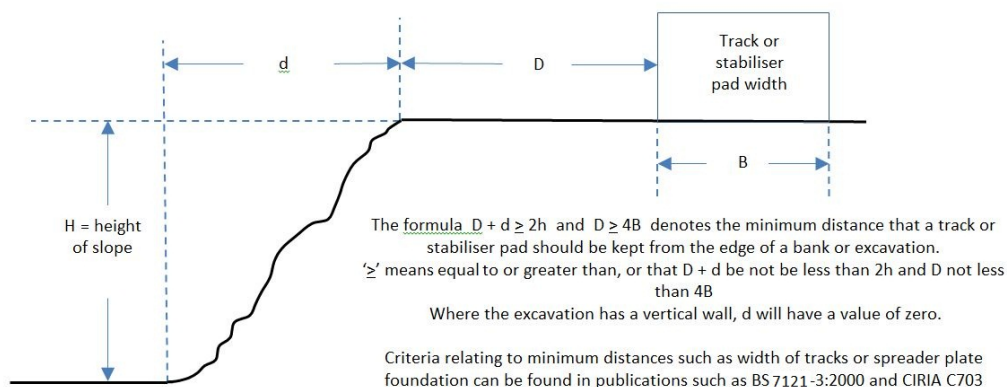
- Conditions on site need to be taken into account before, during and following work. The jib or boom must be kept well clear of any overhead power lines. Guidance issued by the energy networks utilities indicates what minimum distances must be kept and the higher the voltage in the power line, the greater the distance that must be kept. This is to reduce the danger of arcing if the jib or boom is close to but not actually touching the power line.
- Wind speeds should be regularly monitored so that work is only undertaken when they are below the maximum authorised speed stipulated by the crane manufacturer. Gusts of wind may also need to be taken into account, even if overall wind speeds are below the set limit.
- Loads with a large surface area can, in high winds, move and/or swing, making the hoist rope to go out of line vertically and could cause the crane to go out of radius.
- Crawler cranes can generally only lift loads when the crane is level both longitudinally (forward/backward) and laterally (sideways).
- If a heavy load is lifted and the crane is not level laterally, the load will be hanging offset and this places a side loading on the boom or jib. Excessive lateral leaning could cause the crane to become unstable and overturn.
- Slewing with a load, especially one that is near to the rated capacity for the configuration, needs to be undertaken with caution as slewing too fast can subject the jib or boom to additional side stress, and could also cause the load to overshoot the landing place and strike a structure or object.

# CPCS RENEWAL TEST FACTSHEET

- Rigging, pre-use checks or reconfiguring requires, in most cases, access to many parts of the crane which involve both access to and working at height.
- Where a portable ladder is being used to reach part of the crane, it should be secured and there should be at least three rungs or at least one metre beyond the landing level.
- Where temporary or inbuilt access ladders are being used, there should be sufficient foot penetration on each rung (the centre of the foot can reach the rung) and the rung must provide sufficient foot grip to minimise slipping.

## Stability

- Due to the various factors mentioned, crawler cranes have become unstable and overturned, with the usual costly consequences.
- Effective planning of the ground, working area and other environmental factors must be taken into account before setting up begins. Ground conditions naturally play an important part in stability and should be checked by a suitable and competent person to ensure the ground can support the bearing pressure applied through each track.
- The bearing pressure applied through each part of each track varies depending on the position of the jib or boom and the weight of the load being lifted. For example, if the jib or boom is in line with the crane's tracks and is fully raised with no load attached, then the ground bearing pressure is concentrated across the rear of both tracks. This is because the counterweight and high jib/boom biases the weight towards the rear of the crane. However if a load is lifted and the boom lowered, the bearing pressure moves from the rear towards the front of the tracks.
- Ground conditions are crucial for maintaining stability of a crawler crane during operations, and the lifting team, including the operator, need to take into account changes to the ground, such as after heavy rain, which can weaken the ground and cause instability.
- Ground conditions must be checked (by a competent person) not only before carrying out static lifting duties but also when a load needs to be travelled (for pick and carry duties) as the sinking of one or both tracks has caused a crane to exceed maximum radius and an overturn can or has occurred.
- Travelling with a load requires further considerations. For example, travelling on uneven ground can cause load swing, whilst travelling along a slope means that the crane's centre of gravity moves to the downside of the slope. The centre of gravity can fall outside the width of the tracks and, in principle, could cause an overturn.
- Working near to the edge of a bank or trench has caused accidents. A minimum distance must be kept from the edge as ground is liable to give way and collapse.
- Guidance indicates that the horizontal distance that a crane must be kept from the edge of an unsupported vertical-walled trench must be twice the height of the trench. If the trench has a sloped edge, the horizontal distance from the foot to the top of the slope is added to the horizontal distance from the top edge of the trench to the crane. The diagram below indicates the minimum distance required.



## Sample questions

The following questions are based on the text within this factsheet and indicate how the questions and answers are structured. Based on the factsheet, there is only one correct answer. The correct answer to each question is indicated at the end of this factsheet.

**Q1. A crawler crane can't be moved at the end of shift, and the boom is left raised. What needs to be done if a tower crane is working in the immediate vicinity?**



The boom should be in line with the tower crane's jib



The crawler crane's hook block needs to be fully raised



The boom needs to face the tower crane mast



The boom needs to be below the jib of the tower crane

**Q2. When would a thorough examination of the crane be required?**



When defined by the crane manufacturer



As defined by a nominated competent person



Only at a 6 month period



Only at a 12 month period

## Study checklist

This checklist aims to act as a study aid to ensure that the reader has identified and understood the relevant parts of this factsheet.

Do you know?

1. What the consequences of not checking the crane properly before work starts could be.
2. Why more frequent checks may need to be made on the crane.
3. Who can undertake a thorough examination.
4. What should be contained within a lift plan.
5. What the procedures are if a number of cranes are working within the same area.
6. In what conditions can the RCI be overridden.
7. Why the hook block needs to be positioned directly above the centre of gravity of a load.
8. In what situation does the rated capacity of the crane apply.
9. What the requirements are if the lifting of persons is to take place.
10. When the lifting of loads over people can be undertaken.
11. Why there are minimum distances for working near to overhead power lines.
12. How gusts of winds can affect lifting operations.
13. What the effects are of lifting loads on inclines and slopes.
14. When working at height applies to crawler crane operations.
15. How the position of the jib and load can affect ground bearing pressure of the tracks.
16. What the hazards are of travelling on uneven ground or slopes with a suspended load.
17. How wet weather can affect crawler crane operations.
18. What the minimum distances are that have to be kept from sloped edges.

**Answers to sample questions: Q1: D and Q2: B**