

# Crane Operator Safety

---

## Worksite Preparation

- Determine safe site access
- Investigate support surfaces
  - Use blocking and cribbing
  - Ensure level surfaces
  - Be aware of hidden or invisible hazards like underground tanks
  - Near an excavation with vertical sides, never allow the crane to get closer to the gap than the depth of the excavation (for loose soil, the depth  $\times$  1.5)
- Check for utility lines and transmitters
  - De-energize transmitters
  - Choose synthetic taglines to reduce the risk of shock
  - Allow a minimum clearance of 60 cm (2 ft) around all objects
- Arrange the work area
  - Use signs/barricades/signalers
  - Control public access
  - Wear high-visibility clothing
- Set up the crane appropriately
  - Maintain equipment
  - Check for corrosion/damage/wear-and-tear
  - Ensure that adequate space is available for the crane to be assembled and operated safely

## Equipment Around Power Lines

When working near overhead lines:

- Survey the work area for hazards
- Locate equipment/activities a safe distance from power lines
- Notify the owner before work begins
- Consider a line energized unless the power company confirms it is not AND it is visibly grounded
- Ensure flagged warnings are in place to mark horizontal and vertical clearance distances
- Use tag lines only when the load might spin into lines, and use polypropylene instead of wire rope
- Observe clearance minimums
- Use non-conductive tools

Be sure the utility company has confirmed the voltage and safe working distance from the power lines. Also, if crane work activities come within 6 meters (20 feet) of lines, you will need:

- |  |                      |
|--|----------------------|
| • An observer                          | • An insulated link  |
| • Barricades                           | • A boom cage guard  |
| • Pre-task plans including emergencies | • A proximity device |

Learn about specific precautions to follow where you work.

## ***Emergency Procedures for Power Line Contact***

- Stay in the crane except in cases of fire or arcing
- If necessary, jump clear of the crane

- Do not touch the crane and the ground at the same time
- Take small steps; shuffling away with your feet together and on the ground will minimize the potential for electric shock
- Avoid touching the crane or load
- Be aware that power may go off and on
- Break contact if safely possible

Minimum Clearance Distances	
Voltage (nominal, kV, alternating current)	Minimum clearance distance
Up to 50 kV	3 meters (10 feet)
Over 50 to 200 kV	4.5 meters (15 feet)
Over 200 to 350 kV	6 meters (20 feet)
Over 350 to 500 kV	7.6 meters (25 feet)
Over 500 to 750 kV	10.6 meters (35 feet)
Over 750 to 1,000 kV	13.7 meters (45 feet)
Over 1,000 kV	Must be established by the power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution

## Operation

Avoid **tipping** by never exceeding limits specified on the load chart and range diagram and using outriggers. Maintain visibility of the boom and load block and use a signal person, as needed.

## Signaling

- Make sure hand signaler is visible
- Repeat and confirm voice commands before operation is performed
- Stop operations if:
  - A "Stop" command is given
  - More instructions are needed
  - Instructions are misunderstood or unclear
  - Operator is unable to see/hear the signaler

## Special Operations

Review safe operations and practices for special operations, such as:

- Pick and carry
- Clamshell and dragline
- Pile driving and drilling shafts
- Demolition work
- Barge work and turning a load
- High-voltage scrap magnets

## Conditions Affecting Operations

There are certain conditions that can affect the normal course of operations. The most common of these are the environment, side loading, dynamic loading, and equipment condition.

Cold and freezing temperatures:

- Reduce crane strength
- Increase load weight
- Freeze parts to ground

Wind:

- Increases load instability at higher levels
- Causes power lines to swing

Water and wet conditions:

- Affect mechanical parts
- Alter load weight
- Obscure and weaken support surfaces

Extreme temperatures:

- Cause power lines to sag

Poor visibility:

- Slows down operations
- Masks obstructions
- Obscures hand signals; use voice signals instead

Side loading:

- Must be limited to the amount caused by a freely suspended load
- Capacity must be reduced for loads not listed in the load chart
- Never deliberately pull or drag a load sideways

Dynamic loading:

- The faster you move, the more dynamic forces you create
- The greater the weight of the load, the greater the dynamic load
- The faster the speed of operation, the greater the dynamic load

## Crane Terms

<b>Ball</b>	Used in conjunction with the boom hoist drum to change the crane's boom angle
<b>Block</b>	The block contains the pulleys and the hook that attaches the load to the crane
<b>Blocking</b>	The placement of wooden blocks, other designated blocking materials, or jack stands under equipment and components to keep them secure and stable
<b>Boom</b>	The "arm" that extends to give the crane the ability to lift a load over an area
<b>Boom point</b>	Where the jib connects to the boom
<b>Cab</b>	The operator's compartment on a crane
<b>Clutch</b>	A device for the engagement or disengagement of power
<b>Cribbing</b>	The placement of a machine or component onto alternating tiers of blocks that act as a support base to create stability

<b>Dragline bucket</b>	Dragline attachments are used to excavate or hoist material that is below the grade on which the crane is placed, such as underwater
<b>Drum (winding drum)</b>	The cylindrical object that the hoist wires wrap around to raise and lower the load
<b>Dynamic loading</b>	Extra force applied to the crane that is not accounted for in the load chart. The forces produced by wind, swinging the load, and abrupt stopping are examples of dynamic loading.
<b>Extension</b>	A boom extension or "fly." Generally weaker than the main boom.
<b>Float</b>	A rigid support that attaches to an outrigger to spread the surface load weight
<b>Fly jib</b>	An extension attached to the boom for added length to carry the load. Also referred to as jib or boom extension.
<b>Guy line</b>	A tensioned wire cable used to support and stabilize the crane by counterbalancing
<b>Hoist</b>	The action of lifting and lowering the load
<b>Holding line</b>	The line that holds the load block
<b>House</b>	The house covers the machinery mounted on the upper revolving frame
<b>Jib</b>	An extension attached to the boom for added length to carry the load. Also referred to as fly jib or boom extension.
<b>Jib backstay</b>	Works with the strut to raise and support the jib
<b>Jib strut</b>	Works with the backstay to raise and support the jib
<b>Load block</b>	The block contains the pulleys and the hook that attaches the load to the crane
<b>Lower</b>	The portion of the crane located below the turntable bearing at the top of the crane tower
<b>Lower sheave</b>	A wheel with a groove for a wire rope to run on. The lower sheave is located above the hook
<b>Outriggers</b>	The parts of the crane that extend outward to stabilize it by increasing the footprint over which the load is carried
<b>Pick and carry</b>	The lifting of a load and traveling with it suspended
<b>Power pin</b>	Secures the connection of two booms or of a boom and jig
<b>Reeving</b>	The passing of ropes over pulleys or sheaves
<b>Side loading</b>	Using the crane to pull or push a load horizontally when the load is not free to swing with the crane
<b>Slewing platform</b>	The part of the crane that contains the cab and that allows the crane to rotate
<b>Swing brake</b>	Controls and stops excessive swing of the load lines
<b>Tag line</b>	The tensioned line that keeps the load in line with the crane and helps reduce swinging. Also, a rope used by personnel on the ground to help guide a load into place.
<b>Upper</b>	The portion of the crane located above the turntable bearing at the top of the tower
<b>Upper sheave</b>	A wheel with a groove for a wire rope to run on. The upper sheave is located at the upper tip of the boom or jig.