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# CRANE SAFETY MANUAL

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ALL ELECTRIC LIGHT-DUTY, ELECTRIC-HYDRAULIC, AND FULL HYDRAULIC CRANES

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This manual also available online at [www.venturo.com](http://www.venturo.com).



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**INTRODUCTION**

**OPERATOR REQUIREMENTS**

# INTRODUCTION

## SAFETY

A WORD TO OWNERS, OPERATORS AND SERVICE PERSONNEL ABOUT SAFETY



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- FAILURE TO READ THIS MANUAL IS A MISUSE OF THE EQUIPMENT. ANYONE WHO WILL OPERATE, SERVICE, OR WORK AROUND THIS CRANE SHALL FIRST READ THIS MANUAL. DEATH OR SERIOUS INJURY WILL RESULT FROM IMPROPER USE OR MAINTENANCE OF THIS CRANE.

Occupational safety is of prime concern in the design and production of this crane. This booklet was written with the safety of the operator and others who work around this crane as our goal. Included in this manual is OSHA 1910.180 standards which should be used as part of your safety, operation, and maintenance program.

It is your responsibility to know the specific requirements, governmental regulations, precautions, and work hazards which exist. You should make these known to all personnel working with the equipment or in the area, so that all of you may take the necessary and required safety precautions. Failure to heed these instructions can result in death or serious injury.

It is your responsibility to operate and maintain your crane with skill, good judgement, and caution. Following recognized safety procedures will help you avoid accidents. Modification to any part of this crane can create a safety hazard and therefore shall not be made without the manufacturer's written approval. Use only factory approved parts to repair or maintain this crane. If this crane is rebuilt or remounted, mounting procedures, retesting, and re-certification is required in accordance with factory instructions.

Disconnecting, removing, or disabling any safety device is a misuse of the crane and may cause death or serious injury.

As an owner or employer, it is your responsibility to instruct the operator in the safe operation of your equipment and to provide the operator with properly maintained equipment.

Keep children, visitors, and untrained personnel away from the crane. Be capable, careful, and concerned! Make safety your everyday business.



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# BEFORE OPERATION REQUIREMENTS

Read again the safety, warning, and instruction labels.

This truck-mounted crane is designed as a load handling unit and is not a personnel hoist. Only qualified personnel who have demonstrated an understanding of proper use of the crane should operate it. It is therefore essential that the operator has received a thorough training before being allowed to operate the crane. **IF YOU HAVE NOT BEEN TRAINED, DO NOT OPERATE THIS CRANE.**

Pre-determine the crane's ability to handle the load:

1. Determine the weight of the load and the load handling equipment.
2. Determine the radius from centerline of crane rotation to position of load.
3. Determine the radius from centerline of crane rotation to center point where load is being moved.
4. Refer to the capacity chart for crane and determine that load and radius of lifting are within the crane's capacity.

## OPERATION REQUIREMENTS

Read and understand the following safety requirements.

- Since the manufacturer has no direct control over the crane application and operation, conformance with good safety practices is the responsibility of the operator.
- Allow only authorized and qualified personnel, who have demonstrated that they understand the proper operation of the crane, to operate the crane.
- Read and obey all DANGER, WARNING, CAUTION, and operating instructions.
- Any overhead wire shall be considered to be an energized line. Maintain safe clearance from all lines.
- The truck and crane are to be positioned on firm level surfaces with the outriggers always set and the chassis brakes engaged.
- Ensure that the load is within the rated design capacity for lifting as reflected on the load capacity chart.



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# DO'S & DON'TS FOR PROPER AND SAFE OPERATION

- Always refer to the load charts before making a lift. DO NOT exceed load chart capacities.
- Pre-plan your lift.
- Ensure the load is secured and properly rigged before starting any lift operation.
- Be certain the end of the boom is centered directly over the load before lifting. Dragging the load with the winch or boom from any direction is prohibited.
- Never lift two or more separately rigged loads at the same time even if the combined load weight is within rated capacity.
- Avoid load swinging.
- Never use the boom for any other purpose than hoisting and positioning intended loads.
- Regardless of whether or not a load is attached, do not position boom or hook over a person.
- Do not allow the load block (snatch block) to contact the boom sheave head by winching, by extending, or by lowering the boom. This condition, known as two blocking, can cause load dropping, cable (wirerope) breakage, equipment damage, and possible personnel injury.
- Never allow personnel to ride the load, sling, or hook.
- Know all standard crane hand signals, a copy of which is included in this manual.
- Stay clear of outriggers while operating.
- Do not allow unauthorized personnel or equipment to enter within 10 feet of crane operating reach.
- Do not leave crane unattended with suspended load.
- At all times ensure that hands, feet, hair, and loose clothing are kept away from moving sheaves, drums, and cables (wirerope). Never handle cable (wirerope) with bare hands.
- Never wrap cable (wirerope) around the load in place of a sling or chain. Use only approved chains and slings as loading accessories.



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# INSPECTION REQUIREMENTS BEFORE OPERATING

## SAFETY IN EQUIPMENT MAINTENANCE AND INSPECTION

Safety operation depends on you, the condition of your crane, and your maintenance and inspection procedures. The single most important factor in the prevention of equipment failures and accidents is a positive attitude towards safety. The habit of anticipating possible problems normally prevents many accidents from occurring.

Inspection checks are not to be overlooked. Below are listed several important inspections that should be performed before and during operation of the crane. Further detailed inspection requirements are listed in the crane's manual under maintenance.

- Chassis- Check oil level, battery, lights, and brakes.
- Tires - Check for proper inflation, cuts, loose wheel nuts.
- Safety accessories - Check for proper function, oil level, leaks, etc.
- Structural - Visually inspect complete crane for damage especially for cracks in weldments.
- Fasteners - Check all pins, sheaves, retainers, bolts, and nuts. Check for presence and proper tightness.
- Sheaves - Check for rope wear, cracks, and bearing condition.
- Hose / Fittings - Check for leaks, abrasion, and loose clamps.
- Lifting Rope/Slings - Check rope and slings for frayed edges, broken strands, kinks, flat spots, and end attachments for unsafe conditions.
- Crane Hooks - Check hook for safety catch, twist end opening of hook throat.
- Covers & Guards - Check for proper installation.
- Operating Placards and Safety Signs - Check for missing, illegible, defaced signs, and placards.
- Wire rope - Inspect wire rope for corrosion, broken strands, or excessive wear.

Report and/or repair any item found to be unacceptable prior to operating the crane.

Government regulations require that periodic inspections be made. The manufacturer suggests the employer perform daily and monthly inspections and maintain results of these inspections for each crane, and that a thorough annual inspection of the crane shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. The employer shall maintain a record of the dates and results of the inspections for each crane and its optional equipment.



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# CRANE OPERATOR - MINIMUM REQUIREMENTS

Crane operation shall be limited to personnel with the following minimum requirements:

1. Designated, competent, and experienced persons.
2. Trainees or untrained persons under the direct supervision of qualified persons.
3. Maintenance and test personnel, only insofar as it is necessary for the performance of their duties.
4. Supervisor with a designated qualified person present.

Operators and trainees should meet the following minimum physical qualifications:

1. Have vision of at least 20/30 Snellen in one eye, and 20/50 in the other with or without corrective lenses.
2. Be able to distinguish colors regardless of their position, if color perception is required for operation.
3. Hearing, with or without hearing aid, must be adequate for the specific operation.
4. A history of mental stability and not subject to epileptic seizures, dizziness, or any other disability which may cause injury to himself or others present at the jobsite.
5. If an operator becomes physically or mentally unfit, he shall disqualify himself.
6. No one should operate the crane while under the influence of alcohol, drugs, prescription medicine, or anything that might impair their abilities.

In addition to the above listed requirements, the operator should:

1. Demonstrate the ability to read, comprehend, and interpret all placards, operator's manuals, safety codes, and other information pertinent to correct, safe crane operation.
2. Possess knowledge of emergency procedures and implementation of same.
3. An operator shall demonstrate to the employer the ability to operate the crane or provide satisfactory evidence of qualifications and experience to do so.
4. Be familiar with all relevant safety standard codes and applicable governmental regulations.
5. Recognize and be responsible for all maintenance requirements of the crane operated by him or trainees under his supervision.
6. Be thoroughly familiar with the crane being operated and its control functions.
7. Have read and fully comprehend the operating procedures as outlined in this manual.



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# OPERATION: QUALIFICATIONS AND RESPONSIBILITIES

## 5-3.1.1 Operators

(a) Cranes shall be operated only by the following personnel:

- (1) those who have met the requirements of paras. 5-3.1.2(a) through (c) and (f).
- (2) those who have met the requirements of para. 5-3.1.2(d) and who are training for the type of crane being operated. While operating the crane, trainees shall be under the supervision of a designated person. The number of trainees permitted to be supervised by a single designated person, the physical location of the designated person while supervising, and the type of communication required between the designated person and the trainee shall be determined by a qualified person.
- (3) maintenance personnel who have completed all operator trainee qualification requirements. Operation by these persons shall be limited to those crane functions necessary to perform maintenance on the crane or to verify the performance of the crane after maintenance has been performed.
- (4) inspectors who have completed all operator trainee qualification requirements. Operation by these persons shall be limited to those crane functions necessary to accomplish the inspection.

(b) Only the personnel specified in para. 5-3.1.1(a), oilers, supervisors, and those specific persons authorized by supervisors shall enter a crane cab. Persons shall only enter the cab when their duties require them to do so, and then only with the knowledge of the operator or other appointed persons.

## 5-3.1.2 Qualifications for Operators

Operators shall be required to successfully meet the qualifications for the specific type of crane (see Figs. 5-0.2.1-1 through 5-0.2.1-10) that they are operating.

(a) Operator and operator trainees shall meet the following physical qualifications unless it can be shown that failure to meet the qualifications will not affect the operation of the crane. In such cases, specialized clinical or medical judgments and tests may be required.

- (1) vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.
- (2) ability to distinguish colors, regardless of position, if color differentiation is required.
- (3) adequate hearing to meet operational demands, with or without hearing aid.
- (4) sufficient strength, endurance, agility, coordination, and speed of reaction to meet the operation demands.
- (5) normal depth perception, field of vision, reaction time, manual dexterity, coordination, and no tendencies to dizziness or similar undesirable characteristics.
- (6) a negative result for a substance abuse test. The level of testing will be determined by the standard practice for the industry where the crane is employed and this test shall be confirmed by a recognized laboratory service.
- (7) no evidence of having physical defects or emotional instability that could render a hazard to the operator or others, or that in the opinion of the examiner could interfere with the operator's performance. If evidence of this nature is found, it may be sufficient cause for disqualification.
- (8) no evidence of being subject to seizures or loss of physical control; such evidence shall be sufficient reason for disqualification. Specialized medical tests may be required to determine these conditions.

(b) Operator requirements shall include, but not be limited to, the following:

- (1) evidence of successfully passing a physical examination as defined in para. 5-3.1.2(a).
- (2) satisfactory completion of a written examination covering operational characteristics, controls, and emergency control skills, such as response to fire, power line contact, loss of stability, or control malfunction, as well as characteristic and performance questions appropriate to the crane type for which qualification is being sought.
- (3) demonstrated ability to read, write, comprehend, and use arithmetic and a load rating chart, in the language of the crane manufacturer's operation and maintenance instruction materials.
- (4) satisfactory completion of a combination written and verbal test on load rating chart usage that covers a selection of the configurations (the crane may be equipped to handle) for the crane type for which qualification is being sought.

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# OPERATION: QUALIFICATIONS AND RESPONSIBILITIES

- (5) satisfactory completion of an operation test demonstrating proficiency in performing lifting, lowering, booming, telescoping, and swinging functions at various radii as well as shutdown. Testing shall also include proficiency in prestart and poststart inspection, securing procedures, and traveling by appropriate written, oral, or practical methods.
- (6) demonstrated understanding of the applicable sections of the B30 Standard and federal, state, and local requirements.
- (c) Operators who have successfully qualified for a specific crane type shall be required to be requalified if supervision deems it necessary. requalification shall include, but not be limited to, the following:
- (1) evidence of successfully passing a current physical examination as defined in para. 5-3.1.2(a)
  - (2) satisfactory completion of a written examination covering operational characteristics, controls, and emergency control skills, such as response to fire, power line contact, loss of stability, or control malfunction, as well as characteristic and performance stability questions appropriate to the crane type for which requalification is being sought
  - (3) demonstrated ability to read, write, comprehend, and use arithmetic and a load rating chart, in the language of the crane manufacturer's operation and maintenance instruction materials
  - (4) satisfactory completion of a combination written and verbal test on load rating chart usage that covers a selection of the configurations (the crane may be equipped to handle) for the crane type for which requalification is being sought
  - (5) satisfactory completion of an operation test demonstrating proficiency in handling the specific crane type for which requalification is being sought, including both prestart and poststart inspections, maneuvering skills, shutdown, and securing procedures
  - (6) demonstrated understanding of the applicable sections of the B30 Standard and federal, state, and local safety requirements
- (d) Trainee qualification requirements shall include, but not be limited to, the following:
- (1) evidence of successfully passing a current physical examination as defined in para. 5-3.1.2(a)
  - (2) satisfactory completion of a written examination covering safety, operational characteristics and limitations, and controls of the crane type for which qualification is being sought
  - (3) demonstrated ability to read, write, comprehend, and use arithmetic and a load rating chart, in the language of the crane manufacturer's operations and maintenance instruction materials
  - (4) satisfactory completion of a combination written and verbal test on load rating chart usage covering various crane configurations
- (e) Trainee qualification, operator qualification, and operator requalification shall be performed by a designated person who, by experience and training, fulfills the requirements of a qualified person.
- (f) Operator physical examinations shall be required every 3 yr as defined in para. 5-3.1.2(a), or more frequently if supervision deems it necessary.

## 5-3.1.3 Responsibilities

While the organizational structure of various projects may differ, the following roles are described here for purposes of delineating responsibilities. All responsibilities listed below shall be assigned in the work site organization. (A single individual may perform one or more of these roles.)

- (a) *Crane Owner*. The crane owner has custodial control of a crane by virtue of lease or ownership.
- (b) *Crane User*. The crane user arranges the crane's presence on a worksite and controls its use there.
- (c) *Site Supervisor*. The site supervisor exercises supervisory control over the work site on which a crane is being used and over the work that is being performed on that site.
- (d) *Lift Director*. The lift director directly oversees the work being performed by a crane and the associated rigging crew.
- (e) *Crane Operator*. The crane operator directly controls the crane's functions.
- (5) 5-3.1.3.1 Responsibilities of the Crane Owner and Crane User. In some situations the owner and the user may be the same entity and is therefore accountable for all of the following responsibilities. In other cases, the user may lease or rent a crane from the owner without supervisory, operational, maintenance, support personnel, or services from the owner. In these situations, paras. 5-3.1.3.1.1 and 5-3.1.3.1.2 shall apply.

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# OPERATION: QUALIFICATIONS AND RESPONSIBILITIES

**5-3.1.3.1 Responsibilities of the Crane Owner and Crane User.** In some situations the owner and the user may be the same entity and is therefore accountable for all of the following responsibilities. In other cases, the user may lease or rent a crane from the owner without supervisory, operational, maintenance, support personnel, or services from the owner. In these situations, paras. 5-3.1.3.1.1 and 5-3.1.3.1.2 shall apply.

**5-3.1.3.1.1 Crane Owner.** The crane owner's responsibilities shall include the following:

- (a) providing a crane that meets the requirements of Chapters 5-1 and 5-2 as well as specific job requirements defined by the user
- (b) providing a crane and all necessary components, specified by the manufacturer, that meets the user's requested configuration and capacity
- (c) providing all applicable load rating chart(s) and diagrams
- (d) providing additional technical information pertaining to the crane, necessary for crane operation, when requested by the crane user
- (e) providing field assembly, disassembly, operation, maintenance information, and warning decals and placards installed as prescribed by the crane manufacturer
- (f) establishing an inspection, testing, and maintenance program in accordance with Chapter 5-2 and informing the crane user of the requirements of this program
- (g) designating personnel in accordance with Section 5-03 for the purpose of maintenance, repair, transport, assembly and disassembly
- (h) designating personnel in accordance with Section 5-0.3 for inspections as required in Section 5-2.1
- (i) maintaining the rope information listed in para. 5-1.1.4(b) for the rope currently installed on each drum

**5-3.1.3.1.2 Crane User.** The crane user's responsibilities shall include the following:

- (a) complying with the requirements of this Volume, manufacturer's requirements, and those regulations applicable at the worksite.
- (b) using supervisors for crane activities that meet the requirements for a qualified person as defined in para. 5-0.2.2.
- (c) ensuring that the crane is in proper operating condition prior to initial use at the worksite by
  - (1) verifying that the crane owner has provided documentation that the crane meets the requirements of para. 5-2.1.5
  - (2) verifying that a frequent inspection has been performed as defined in para. 5-2.1.2
- (d) verifying that the crane has the necessary lifting capacity to perform the proposed lifting operations in the planned configuration. Load rating charts may be temporarily removed from the crane for lift planning or other purposes provided the charts are replaced in the manufacturer's designated location before operating the crane.
- (e) using crane operators that meet the requirements of paras. 5-3.1.1 and 5-3.1.2(f) and are qualified to perform the tasks that will be required with the crane to which they are assigned to operate.
- (f) ensuring the assigned operator(s) has been notified of adjustments or repairs that have not yet been completed, prior to commencing crane operations.
- (g) designating personnel in accordance with Section 5-0.3 for the purpose of maintenance, repair, transport, assembly and disassembly.
- (h) designating personnel in accordance with Section 5-0.3 for inspections as required in Section 5-2.1.
- (i) ensuring that all personnel involved in maintenance, repair, transport, assembly, disassembly, and inspection are aware of their responsibilities, assigned duties, and the associated hazards.
- (j) ensuring that the inspection, testing, and maintenance programs specified by the crane owner are followed.
- (k) informing the crane owner if any rope on the crane is replaced or shortened. If a rope is replaced, the wire rope information listed in para. 5-1.1.4(b), shall be provided as well as the date of replacement.

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# SAFE VEHICLE TRANSPORTATION

## TRANSPORTING TRUCK AND CRANE

1. Before transporting:
  - a. Be sure that outriggers are stowed properly.
  - b. The load line shall be hooked to truck bed, truck frame, or boom rack, to secure the boom and hook weight during transport. Do not by any method over-tension the hook stow hardware or damage could result.
  - c. Secure boom properly in approved boom rest.
  - d. Secure all loose items to the truck bed.
  - e. Disengage PTO.
  - f. Release park brake.
2. Do not travel with load on hook.
3. Be sure that tires are properly inflated.
4. Make sure that there is enough clearance before entering any underpass.
5. Do not allow any persons to ride on the truck or crane when it is being transported.
6. A signal man may be required when moving or backing unit in areas where visibility is limited.



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# **POWER LINE SAFETY**

# OPERATION: MINIMUM CLEARANCES

REFERENCE: OSHA 1926.1408 (a)(2)(iii)

Table A -- Minimum Clearance Distances

VOLTAGE (nominal, kV, alternating current)	MINIMUM CLEARANCE DISTANCE (feet)
Up to 50 .....	10
Over 50 - 200 .....	15
Over 200 - 350 .....	20
Over 350 - 500 .....	25
Over 500 - 750 .....	35
Over 750 - 1000 .....	45
Over 1000 .....	(As established by the utility owner / operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

REFERENCE: OSHA 1926.1411 (b)(2)

Table T -- Minimum Clearance Distances While Traveling with No Load

VOLTAGE (nominal, kV, alternating current)	WHILE TRAVELING - MINIMUM CLEARANCE DISTANCE (feet)
0 - 0.75 .....	4
Over 0.75 - 50 .....	6
Over 50 - 345 .....	10
Over 345 - 750 .....	16
Over 750 - 1000 .....	20
Over 1000 .....	(As established by the utility owner / operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).



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**Power line safety (up to 350kV)-- assembly and disassembly. - 1926.1407**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1407
- Title: Power line safety (up to 350 kV)-- assembly and disassembly.

## §1926.1407

## Power line safety (up to 350 kV) -- assembly and disassembly

- (a) Before assembling or disassembling equipment, the employer must determine if any part of the equipment, load line, or load (including rigging and lifting accessories) could get, in the direction or area of assembly/disassembly, closer than 20 feet to a power line during the assembly/disassembly process. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of this section, as follows:
- (1) *Option (1)-- Deenergize and ground.* Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.
- (2) *Option (2)-- 20 foot clearance.* Ensure that no part of the equipment, load line or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in paragraph (b) of this section.
- (3) *Option (3)-- Table A clearance.*
- (i) *Determine the line's voltage* and the minimum clearance distance permitted under Table A (see §1926.1408).
- (ii) *Determine if any part of the equipment, load line, or load (including rigging and lifting accessories), could get closer than the minimum clearance distance to the power line permitted under Table A (see §1926.1408).* If so, then the employer must follow the requirements in paragraph (b) of this section to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum clearance distance.
- (b) Preventing encroachment/electrocution. Where encroachment precautions are required under Option (2), or Option (3) of this section, all of the following requirements must be met:
- (1) *Conduct a planning meeting* with the Assembly/Disassembly director (ND director), operator, assembly/disassembly crew and the other workers who will be in the assembly/disassembly area to review the location of the power line(s) and the steps that will be implemented to prevent encroachment/electrocution.
- (2) *If tag lines are used, they must be nonconductive.*
- (3) *At least one of the following additional measures* must be in place. The measure selected from this list must be effective in preventing encroachment. The additional measures are:
- (i) *Use a dedicated spotter* who is in continuous contact with the equipment operator. The dedicated spotter must:
- (A) *Be equipped with a visual aid* to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).
- (B) *Be positioned to effectively gauge* the clearance distance. (C) *Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.* (D) *Give timely information to the operator* so that the required clearance distance can be maintained.
- (ii) *A proximity alarm set to give the operator* sufficient warning to prevent encroachment.
- (iii) *A device that automatically warns the operator when* to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.
- (iv) *A device that automatically limits range* of movement, set to prevent encroachment.
- (v) *An elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings.*
- (c) Assembly/disassembly below power lines prohibited. No part of a crane/derrick, load line, or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.
- (d) Assembly/disassembly inside Table A clearance prohibited. No part of a crane/derrick, load line, or load (including rigging and lifting accessories), whether partially or fully assembled, is allowed closer than the minimum approach distance under Table A (see §1926.1408) to a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line.
- (e) Voltage information. Where Option (3) of this section is used, the utility owner/operator of the power lines must provide the requested voltage information within two working days of the employer's request.
- (f) Power lines presumed energized. The employer must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
- (g) Posting of electrocution warnings. There must be at least one electrocution hazard warning conspicuously posted in the cab so that it is in view of the operator and (except for overhead gantry and tower cranes) at least two on the outside of the equipment.

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23276

**Power line safety (up to 350kV)-- equipment operations. - 1926.1408**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1408
- Title: Power line safety (up to 350 kV)-- equipment operations.

## §1926.1408

## Power line safety (up to 350 kV) -- equipment operations

(a) Hazard assessments and precautions inside the work zone. Before beginning equipment operations, the employer must:

(1) *Identify the work zone by either:*

(i) *Demarcating boundaries* (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or

(ii) *Defining the work zone* as the area 360 degrees around the equipment, up to the equipment's maximum working radius.

(2) *Determine if any part of the equipment, load line or load* (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of this section, as follows:

(i) *Option (1)-- Deenergize and ground.* Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.

(ii) *Option (2) -- 20 foot clearance.* Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in paragraph (b) of this section.

(iii) *Option (3)-- Table A clearance.*

(A) *Determine the line's voltage* and the minimum approach distance permitted under Table A (see § 926.1408). (B) *Determine if any part of the equipment, load line or load* (including rigging and lifting accessories), while operating up to the equipment's maximum working radius in the work zone, could get closer than the minimum approach distance of the power line permitted under Table A (see §1926.1408). If so, then the employer must follow the requirements in paragraph (b) of this section to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.

(b) Preventing encroachment/electrocution. Where encroachment precautions are required under Option (2) or Option (3) of this section, all of the following requirements must be met:

(1) *Conduct a planning meeting with the operator and the other workers* who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.

(2) *If tag lines are used*, they must be non-conductive.

(3) *Erect and maintain* an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line (if using Option (2) of this section) or at the minimum approach distance under Table A (see §1926.1408) (if using Option (3) of this section). If the operator is unable to see the elevated warning line, a dedicated spotter must be used as described in §1926.1408(b)(4)(i), (ii), (iv) and (v).

(4) *Implement at least one of the following measures:*

(i) *A proximity alarm set to give the operator* sufficient warning to prevent encroachment.

(ii) *A dedicated spotter who is in continuous contact* with the operator. Where this measure is selected, the dedicated spotter must:

(A) *Be equipped with a visual aid* to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

(B) *Be positioned to effectively gauge* the clearance distance. (C) *Where necessary*, use equipment that enables the dedicated spotter to communicate directly with the operator. (D) *Give timely information* to the operator so that the required clearance distance can be maintained.

(iii) *A device that automatically warns the operator* when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

(iv) *A device that automatically limits range of movement*, set to prevent encroachment.

(v) *An insulating link/device*, as defined in §1926.1401, installed at a point between the end of the load line (or below) and the load.

(5) *The requirements of paragraph (b)(4) of this section* do not apply to work covered by subpart V of this part.

(c) Voltage information. Where Option (3) of this section is used, the utility owner/operator of the power lines must provide the requested voltage information within two working days of the employer's request.

(d) Operations below power lines.

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23277

**Power line safety (up to 350kV)-- equipment operations. - 1926.1408**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1408
- Title: Power line safety (up to 350 kV)-- equipment operations.

- (1) *No part of the equipment*, load line, or load (including rigging and lifting accessories) is allowed below a power line unless the employer has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line, except where one of the exceptions in paragraph (d)(2) of this section applies.
- (2) *Exceptions.* Paragraph (d)(1) of this section is inapplicable where the employer demonstrates that one of the following applies:
- (i) *The work is covered by subpart V of this part.*
  - (ii) *For equipment with non-extensible booms:* The uppermost part of the equipment, with the boom at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.
  - (iii) *For equipment with articulating or extensible booms:* The uppermost part of the equipment, with the boom in the fully extended position, at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.
  - (iv) *The employer demonstrates* that compliance with paragraph (d)(1) of this section is infeasible and meets the requirements of §1926.1410.
- (e) Power lines presumed energized. The employer must assume that at power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
- (f) When working near transmitter/communication towers where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, the transmitter must be deenergized or the following precautions must be taken:
- (1) *The equipment must be provided* with an electrical ground.
  - (2) *If tag lines are used*, they must be non-conductive.
- (g) Training.
- (1) *The employer must train* each operator and crew member assigned to work with the equipment on all of the following:
    - (i) *The procedures to be followed* in the event of electrical contact with a power line. Such training must include:
      - (A) *Information regarding the danger of electrocution* from the operator simultaneously touching the equipment and the ground.
      - (B) *The Importance to the operator's safety* of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the Cab.
      - (C) *The safest means of evacuating* from equipment that may be energized.
      - (D) *The danger of the potentially energized zone* around the equipment (step potential).
      - (E) *The need for crew in the area* to avoid approaching or touching the equipment and the load.
      - (F) *Safe clearance distance from power lines.*
    - (ii) *Power lines are presumed to be energized* unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
    - (iii) *Power lines are presumed to be uninsulated* unless the utility owner/operator or a registered engineer who is a qualified person with respect to electrical power transmission and distribution confirms that a line is Insulated.
    - (iv) *The limitations of an insulating link/device*, proximity alarm, and range control (and similar) device, if used.
    - (v) *The procedures to be followed* to properly ground equipment and the limitations of grounding.
  - (2) *Employees working as dedicated spotters* must be trained to enable them to effectively perform their task, including training on the applicable requirements of this section.
  - (3) *Training under this section* must be administered in accordance with §1926.1430(g).
- (h) Devices originally designed by the manufacturer for use as: a safety device (see §1926.1415), operational aid, or a means to prevent power line contact or electrocution, when used to comply with this section, must meet the manufacturer's procedures for use and conditions of use.

Table A Minimum Clearance Distances

Voltage (nominal, kV, alternating current)	Minimum Clearance distance (Feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

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23278

**Power line safety (up to 350kV)-- equipment operations closer the the Table A zone. - 1926.1410**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1410
- Title: Power line safety (up to 350 kV)-- equipment operations closer than the Table A zone.

**§1926.1409****Power line safety (over 350 kV )**

The requirements of §1926.1407 and §1926.1408 apply to power lines over 350 kV except:

- (a) For power lines at or below 1000 kV, wherever the distance "20 feet" is specified, the distance "50 feet" must be substituted; and
- (b) For power lines over 1000 kV, the minimum clearance distance must be established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

**§1926.1410****Power line safety (all voltages) -- equipment operations closer than the Table A zone**

Equipment operations in which any part of the equipment, load line, or load (including rigging and lifting accessories) is closer than the minimum approach distance under Table A of §1926.1408 to an energized power line is prohibited, except where the employer demonstrates that all of the following requirements are met:

- (a) The employer determines that it is infeasible to do the work without breaching the minimum approach distance under Table A of §1926.1408.
- (b) The employer determines that, after consultation with the utility owner/operator, it is infeasible to deenergize and ground the power line or relocate the power line.
- (c) Minimum clearance distance.
  - (1) *The power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution determines the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.*
  - (2) *Paragraph (c)(1) of this section does not apply to work covered by subpart V of this part; instead, for such work, the minimum clearance distances specified in §1926.950 Table V-1 apply. Employers engaged in subpart V work are permitted to work closer than the distances in §1926.950 Table V-1 where both the requirements of this section and §1926.952(c)(3)(i) or (ii) are met.*
- (d) A planning meeting with the employer and utility owner/operator (or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution) is held to determine the procedures that will be followed to prevent electrical contact and electrocution. At a minimum these procedures must include:
  - (1) *If the power line is equipped with a device that automatically reenergizes the circuit in the event of a power line contact, before the work begins, the automatic reclosing feature of the circuit interrupting device must be made inoperative if the design of the device permits.*
  - (2) *A dedicated spotter who is in continuous contact with the operator. The dedicated spotter must:*
    - (i) *Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: a line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).*
    - (ii) *Be positioned to effectively gauge the clearance distance.*
    - (iii) *Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator. (iv) Give timely information to the operator so that the required clearance distance can be maintained.*
  - (3) *An elevated warning line, or barricade (not attached to the crane), in view of the operator (either directly or through video equipment), equipped with flags or similar high-visibility markings, to prevent electrical contact. However, this provision does not apply to work covered by subpart V of this part.*
  - (4) *Insulating link/device.*
    - (i) *An insulating link/device installed at a point between the end of the load line (or below) and the load.*
    - (ii) *For work covered by subpart V of this part, the requirement in paragraph (d)(4)(i) of this section applies only when working inside the §1926.950 Table V-1 clearance distances.*
      - (ii) *For work covered by subpart V of this part involving operations where use of an insulating link/device is infeasible, the requirements of §1910.269(p)(4)(iii)(13) or (C) may be substituted for the requirement in (d)(4)(i) of this section.*
      - (iv) *Until (INSERT DATE 1 YEAR AND 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER), the following procedure may be substituted for the requirement in paragraph (d)(4)(i) of this section: all employees, excluding equipment operators*

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**-****23279**

**Power line safety (up to 350kV)-- equipment operations closer the the Table A zone. - 1926.1410**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1410
- Title: Power line safety (up to 350 kV)-- equipment operations closer than the Table A zone.

located on the equipment, who may come in contact with the equipment, the load line, or the load must be insulated or guarded from the equipment, the load line, and the load. Insulating gloves rated for the voltage involved are adequate insulation for the purposes of this paragraph.

(v) *Until [INSERT DATE 3 YEARS AND 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER], the*

following procedure may be substituted for the requirement in (d)(4)(1) of this section:

(A) *The employer must use a link/device manufactured on or before [INSERT DATE 1 YEAR AND 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER], that meets the definition of an Insulating link/device, except that it has not been approved by a Nationally Recognized Testing Laboratory, and that is maintained and used in accordance with manufacturer requirements and recommendations, and is installed at a point between the end of the load line (or below) and the load; and*

(B) *All employees, excluding equipment operators located on the equipment, who may come in contact with the equipment, the load line, or the load must be insulated or guarded from the equipment, the load line, and the load through an additional means other than the device described in paragraph (d)(4)(v)(A) of this section. Insulating gloves rated for the voltage involved are adequate additional means of protection for the purposes of this paragraph.*

(5) *Nonconductive rigging* if the rigging may be within the Table A of §1926.1408 distance during the operation.

(6) *if the equipment is equipped with a device that automatically limits range of movement, it must be used and set to prevent any part of the equipment, load line, or load (including rigging and lifting accessories) from breaching the minimum approach distance established under paragraph (c) of this section.*

(7) *If a tag line is used, it must be of the nonconductive type.*

(8) *Barricades forming a perimeter* at least 10 feet away from the equipment to prevent unauthorized personnel from entering the work area. In areas where obstacles prevent the barricade from being at least 10 feet away, the barricade must be as far from the equipment as feasible.

(9) *Workers other than the operator* must be prohibited from touching the load line above the insulating link/device and crane. Operators remotely operating the equipment from the ground must use either wireless controls that isolate the operator from the equipment or insulating mats that insulate the operator from the ground.

(10) *Only personnel essential to the operation* are permitted to be in the area of the crane and load.

(11) *The equipment must be properly grounded.*

(12) *Insulating line hose or cover-up* must be installed by the utility owner/operator except where such devices are unavailable for the line voltages involved.

(e) The procedures developed to comply with paragraph (d) of this section are documented and immediately available on-site.

(f) The equipment user and utility owner/operator (or registered professional engineer) meet with the equipment operator and the other workers who will be in the area of the equipment or load to review the procedures that will be implemented to prevent breaching the minimum approach distance established in paragraph (c) of this section and prevent electrocution.

(g) The procedures developed to comply with paragraph (d) of this section are implemented.

(h) The utility owner/operator (or registered professional engineer) and all employers of employees involved in the work must identify one person who will direct the implementation of the procedures. The person identified in accordance with this paragraph must direct the implementation of the procedures and must have the authority to stop work at any time to ensure safety.

(i) [Reserved.]

(j) If a problem occurs implementing the procedures being used to comply with paragraph (d) of this section, or indicating that those procedures are inadequate to prevent electrocution, the employer must safely stop operations and either develop new procedures to comply with paragraph (d) of this section or have the utility owner/operator deenergize and visibly ground or relocate the power line before resuming work.

(k) Devices originally designed by the manufacturer for use as a safety device (see §1926.1415), operational aid, or a means to prevent power line contact or electrocution, when used to comply with this section, must comply with the manufacturer's procedures for use and conditions of use.

(l) [Reserved.]

(m) The employer must train each operator and crew member assigned to work with the equipment in accordance with §1926.1408(g).

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23280



**Power line safety -- while traveling under or near lines with no load. - 1926.1411**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1411
- Title: Power line safety -- while traveling under or near power lines with no load.

## §1926.1411

Power line safety--while traveling under or  
near power lines with no load

(a) This section establishes procedures and criteria that must be met for equipment traveling under or near a power line on a construction site with no load. Equipment traveling on a construction site with a load is governed by §1926.1408, 1926.1400 or 1926.1410, whichever is appropriate, and §1926.1417(u). (b) The employer must ensure that:

- (1) *The boom/mast and boom/mast support system* are lowered sufficiently to meet the requirements of this paragraph.
- (2) *The clearances specified* in Table T of this section are maintained.
- (3) *The effects of speed and terrain* on equipment movement (including movement of the boom/mast) are considered so that those effects do not cause the minimum clearance distances specified in Table T of this section to be breached.
- (4) *Dedicated spotter*. If any part of the equipment while traveling will get closer than 20 feet to the power line, the employer must ensure that a dedicated spotter who is in continuous contact with the driver/operator is used. The dedicated spotter must:
  - (i) *Be positioned to effectively gauge* the clearance distance.
  - (ii) *Where necessary*, use equipment that enables the dedicated spotter to communicate directly with the operator.
  - (iii) Give *timely/information to the operator* so that the required clearance distance can be maintained.
- (5) *Additional precautions for traveling* in poor visibility. When traveling at night, or in conditions of poor visibility, In addition to the measures specified in paragraphs (b)(1) through (4) of this section, the employer must ensure that:
  - (i) *The power lines are illuminated* or another means of identifying the location of the lines is used.
  - (ii) *A safe path of travel is identified and used*.

Table T -- Minimum Clearance Distances While Traveling With No Load

Voltage (nominal, kV, alternating current)	While Traveling -- Minimum clearance distance (feet)
up to 0.75	4
over .75 to 506	6
over 50 to 345	10
over 345 to 750	16
Over 760 to 1,000	20
Over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

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23281

# **SIGNALS**

**Signals -- general requirements. - 1926.1419**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1419
- Title: Signals -- general requirements.

## §1926.1419

## Signals -- general requirements

(a) A signal person must be provided in each of the following situations:

- (1) *The point of operation*, meaning the load travel or the area near or at load placement, is not in full view of the operator,
- (2) *When the equipment is traveling*, the view in the direction of travel is obstructed.
- (3) *Due to site specific safety concerns*, either the operator or the person handling the load determines that it is necessary.

(b) Types of signals. Signals to operators must be by hand, voice, audible, or new signals.

(c) Hand signals.

- (1) *When using hand signals*, the Standard Method must be used (see Appendix A of this subpart). Exception: Where use of the Standard Method for hand signals is infeasible, or where an operation or use of an attachment is not covered in the Standard Method, non-standard hand signals may be used in accordance with paragraph (c)(2) of this section.
- (2) *Non-standard hand signals*. When using non-standard hand signals, the signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used.

(d) New signals. Signals other than hand, voice, or audible signals may be used where the employer demonstrates that:

- (1) *The new signals provide* at least equally effective communication as voice, audible, or Standard Method hand signals, or
- (2) *The new signals comply with* a national consensus standard that provides at least equally effective communication as voice, audible, or Standard Method hand signals.

(e) Suitability. The signals used (hand, voice, audible, or new), and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions.

(f) During operations requiring signals, the ability to transmit signals between the operator and signal person must be maintained. If that ability is interrupted at anytime, the operator must safely stop operations requiring signals until it is reestablished and a proper signal is given and understood.

(g) If the operator becomes aware of a safety problem and needs to communicate with the signal person, the operator must safely stop operations. Operations must not resume until the operator and signal person agree that the problem has been resolved.

(h) Only one person may give signals to a crane/derrick at a time, except in circumstances covered by paragraph (j) of this section.

(i) [Reserved.]

(j) Anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal. NOTE: §1928.1417(y) requires the operator to obey a stop or emergency stop signal. (k) All directions given to the operator by the signal person must be given from the operator's direction perspective.

(l) [Reserved.]

(m) Communication with multiple cranes/derricks. Where a signal person(s) is in communication with more than one crane/derrick, a system must be used for identifying the crane/derrick each signal is for, as follows:

- (1) *for each signal*, prior to giving the function/direction, the signal person must identify the crane/derrick the signal is for, or
- (2) *must use an equally effective method of identifying* which crane/ derrick the signal is for.



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23282



## Signals -- hand signal chart. - 1926.1422

### Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: CC
- Subpart Title: Cranes & Derricks in Construction
- Standard Number: 1926.1422
- Title: Signals -- hand signal chart.

#### §1926.1420

Signals -- radio, telephone or other electronic  
transmission of signals

- (a) The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.
- (h) Signal transmission must be through a dedicated channel, except;
- (1) *Multiple cranes/derricks* and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.
- (2) *Where a crane is being operated on* or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.
- (c) The operator's reception of signals must be by a hands-free system.

#### §1926.1421

Signals --voice signals -- additional requirements

- (a) Prior to beginning operations, the operator, signal person and lift director (if there is one), must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.
- (h) Each voice signal must contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command,
- (c) The operator, signal person and lift director (if there is one), must be able to effectively communicate in the language used.

#### §1926.1422

Signals -- hand signal chart

Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.



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23283

# KNOW YOUR SIGNALS

## HELP AVOID ACCIDENTS

## KNOW AND USE THESE

## ANSI & OSHA RECOMMENDED HAND SIGNALS



**STOP.** Arm extended, palm down, move arm back and forth horizontally.



**EMERGENCY STOP.** Both arms extended, palms down, move arms back and forth horizontally.



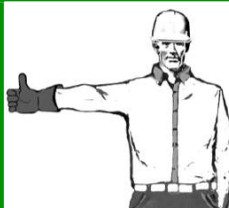
**HOIST.** With forearm vertical, forefinger pointing up, move hand in small horizontal circle.



**LOWER.** With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



**SWING.** Arm extended, point with finger in direction of swing of boom.



**RAISE BOOM.** Arm extended, fingers closed, thumb pointing upward.



**LOWER BOOM.** Arm extended, fingers closed, thumb pointing downward.



**EXTEND BOOM.** (Telescoping booms). Both fists in front of body with thumbs pointing outward.



**EXTEND BOOM.** (Telescoping booms). One hand signal. One fist in front of chest with thumb tapping chest.



**RETRACT BOOM.** (Telescoping booms). Both fists in front of body with thumbs pointing toward each other.



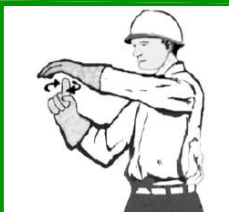
**RETRACT BOOM.** (Telescoping booms). One hand signal. One fist in front of chest, thumb outward and heel of fist tapping chest.



**RAISE THE BOOM AND LOWER THE LOAD.** With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



**LOWER THE BOOM AND RAISE THE LOAD.** With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



**MOVE SLOWLY.** Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly down as an example).



**DOG EVERYTHING.** Clasp hands in front of body.

# **INSPECTION REQUIREMENTS**

# INSPECTION REQUIREMENTS

## REFERENCE OSHA § 1926.1412

### INSPECTIONS

#### PRE-SHIFT (DAILY) INSPECTION BY A COMPETENT PERSON :

A visual inspection must be done prior to each shift. During this inspection if any safety deficiencies are found, the crane must be removed from service until these deficiencies are corrected. Nothing needs to be taken apart unless the visual or pretrial run deem it necessary. We recommend that any deficiencies be noted and kept with the monthly and annual reports. The wire rope and hook must be inspected as well. Use the guideline in your manual to complete this inspection.

#### MONTHLY INSPECTION BY A COMPETENT PERSON :

**Equipment must not be used until this inspection demonstrates that no corrected action is required .**

A monthly inspection is required. This inspection must be documented and maintained by the employer that conducts the inspection for a period of three [3] months. This will also include a wire rope inspection and a hook inspection that must be documented.

#### ANNUAL INSPECTION BY A QUALIFIED PERSON :

Annual inspection is required. This inspection must be documented and kept for a period of twelve [12] months. This is to include a wire rope inspection and hook inspection that is to be documented.

#### EQUIPMENT NOT IN REGULAR USE :

Units that have been idle for a period of three [3] months or more must be inspected by a qualified person in accordance with the requirements of a monthly inspection before initial use.

\* All inspection documentation must be available to inspectors at time of inspection.

\* All owner and safety manuals must be kept with crane at all times and be available for reference. \*See the inspection forms in this manual. You may use these copies for future inspections. \*Wire rope and hook inspections can be found in the owner's manual.

## REFERENCE OSHA §1926.1415 & OSHA §1926.1416

Any deficiencies noted must be documented on a separate sheet. Any operational aids must be repaired within seven [7] calendar days after deficiency occurs.

**EXCEPTION:** If employer documents that it has ordered the necessary parts within seven [7] calendar days of the occurrence of the deficiency, the repair must be completed within seven [7] days of receiving parts.

Any safety device that stops working during operation, operator must safely stop operations and remove the crane from service until device is properly repaired. Repairs should be documented and kept with the crane inspection reports.



VENCO VENTURO INDUSTRIES LLC  
CINCINNATI, OHIO

TITLE

INSP. REQUIREMENTS

CRANES

DATE

08-06-15

SUPERSEDES

-

SECTION

C300

23081

# Crane Inspection Checklist

DATE: \_\_\_\_\_

Unit #	Unit Serial #	Inspector:
Crane Model:	Crane Serial #	Max. Crane Capacity

- NOTES:**
1. Crane must be away from power lines, and leveled with outriggers fully extended before inspecting and operating.
  2. OSHA & ANSI require qualified and competent individuals to inspect / operate cranes.
  3. Inspectors must have been through training, have extensive knowledge and demonstrate ability in the subject matter.

REFERENCES: O = OSHA 1926 Subpart CC (1926.14XX)

A = ANSI / ASME B30.5 (Latest), ASME B30.10 (Latest)

Status: V = Satisfactory X = Deficiency R = Recommendation N/A = Not Applicable

REFERENCE	ITEM	STATUS			REFERENCE	ITEM	STATUS		
	Inspection Frequency	Daily	Monthly	Annual		Inspection Frequency	Daily	Monthly	Annual
<b>General</b>					<b>Outriggers</b>				
A - B30.5-1.9.7	1. Gaurds / Covers				O - 1926.1412(d)(1)(iii)	23. Hydraulic Hoses / Tubes / Fittings			
A - B30.5-3.1.3.3.1(m)	2. No-Load Operational Test				A - B30.51.9.3(a)	24. Outrigger Lock (if manual extend)			
A - B30.5-3.4.7	3. Housekeeping				A - B30.5-2.1.3(o)	25. Cylinders			
O - 1926.1412(f)(2)(xvii)	4. Instructions / Caution / Warning Decals				O - 1926.1412(f)(2)(xiv)	26. Outrigger Pads			
O - 1926.1422	5. Hand Signal Chart				A - B30.5-1.9.3(c)	27. Holding Valves (Vertical O.R. Cylinders)			
A - B30.5-1.1.1	6. 85% Stability Rule & Documentation				O - 1926.1412(f)(2)(i)(C)	28. Welds			
<b>Driver's Cab</b>					A - B30.5-2.1.3(a)	29. Beams			
A - B30.5-3.4.10	7. Fire Extinguisher				O - 1926.1412(f)(2)(xvii)	30. Caution / Warning Signs			
O - 1926.1412(f)(2)(viii)	8. Parking Brake				<b>Operator Controls</b>				
O - 1926.1412(f)(2)(xxi)	9. Access - Grab Rails / Steps				A - B30.5-1.6.1(b)	31. Fully Operating Remote			
A - B30.52.1.3(m)	10. PTO (Power Take Off)				A - B30.5-1.6.1(a)	32. Controls Identified			
A - B30.5-2.1.2(h)	11. Electrical Switches / Functions				A - B30.5-2.1.2(a) & (b)	33. Controls - Forces / Movements			
O - 1926.1417(c)(1)	12. Operators Manual				A - B30.5-1.6.3(a)	34. Remote Start Option			
<b>Chassis</b>					A - B30.5-1.6.3(b)	35. Speed Control on Remote			
A - B30.5-2.1.3(l)	13. Belts / Hoses				<b>Load Chart</b>				
O - 1926.1412(d)(1)(ix)	14. Tire Air Pressure				A - B30.5-1.1(a)	36. Per Configuration			
O - 1926.1412(d)(1)(iii)	15. Hydraulic Hoses / Tubes / Fittings				A - B30.5-1.1.3	37. Durable			
O - 1926.1414(d)(1)(iv)	16. Hydraulic Fluid Level				A - B30.5-1.1.3	38. Legible			
A - B30.5-1.9.7	17. Guards / Covers				A - B30.5-1.1.3	39. Securely Attached			
A - B30.5-1.9.2	18. Exhaust System / Guards & Insulators				<b>Safety Devices / Operational Aide</b>				
A - B30.5-1.6.3(d)	19. Transmission				O - 1926.1416(d)(1)(i)(A)	40. Boom Angle Indicator			
O - 1926.601(b)(14)	20. Driveline				O - 1926.1412(f)(v)	41. Overload Protection / Counter-balance			
A - B30.5-2.1.3(k)	21. Tires / Wheels				O - 1926.1412(a)(1)(i)	42. Crane Level Indicator			
O - 1926.1412(f)(2)(1)(A)	22. Main Frame Members				O - 1926.1415(a)(7)	43. Horn			
					A - B30.5-1.9.10.1	44. Anti-2-Block Device			



VENCO VENTURO INDUSTRIES LLC  
CINCINNATI, OHIO

TITLE  
**CRANE INSP. CHKLST**  
**CRANES**

DATE  
06-10-16A  
SUPERSEDES  
08-06-15

SECTION  
C300  
**23078**

# Crane Inspection Checklist

DATE: \_\_\_\_\_

Unit #	Unit Serial #	Inspector:
Crane Model:	Crane Serial #	Max. Crane Capacity

- NOTES:**
1. Crane must be away from power lines, and leveled with outriggers fully extended before inspecting and operating.
  2. OSHA & ANSI require qualified and competent individuals to inspect / operate cranes.
  3. Inspectors must have been through training, have extensive knowledge and demonstrate ability in the subject matter.

REFERENCES: O = OSHA 1926 Subpart CC (1926.14XX)

A = ANSI / ASME B30.5 (Latest), ASME B30.10 (Latest)

Status: V = Satisfactory X = Deficiency R = Recommendation N/A = Not Applicable

REFERENCE	ITEM	STATUS			REFERENCE	ITEM	STATUS		
	Inspection Frequency	Daily	Monthly	Annual		Inspection Frequency	Daily	Monthly	Annual
Turret					Main Boom				
O - 1926.1412(d)(1)(iii)	45. Hydraulic Hoses / Tubes / Fittings				O - 1926.1412(d)(1)(iii)	62. Hydraulic Hoses / Tubes / Fittings			
O - 1926.1412(f)(2)(i)(B)	46. Structural Fasteners				A - B30.5-2.1.3(o)	63. Lift Cylinder			
A - B30.5-2.1.3(d)	47. Turntable / Rotate / Bearing				A - B30.5-2.1.3(o)	64. Extend Cylinder			
A - B30.5-2.1.3(m)	48. Hydraulic Motor / Pump				O - 1926.1412(f)(2)(xv)	65. Wear Pads			
A - B30.5-2.1.3(n)(6)	49. Hydraulic Pressure				O - 1926.1412(f)(2)(ii)	66. Sheave			
A - B30.5-2.1.2(h)	50.Electric Wiring				O - 1926.1412(f)(2)(i)(C)	67. Welds			
O - 1926.1412(f)(2)(i)(C)	51. Welds				A - B30.5-1.7.4(b)	68. Wire Rope Retainer (Close Fitting Guard)			
Winch					A - B30.5-2.1.3(d)	69. Tower & Lift Cylinder Pins			
O - 1926.1412(d)(1)(iii)	52. Hydraulic Hoses / Tubes / Fittings				A - B30.5-2.1.3(a)	70. Structure			
A - B30.5-2.1.3(m)	53. Hydraulic / Electric Motor / Brake				A - B30.5-1.9.11(g)	71. Electrocution Warning Decal			
O - 1926.1414(d)(1)(iv)	54. Winch Gear Oil Level				Load Block & Hook				
A - B30.5-1.3.2(2)(c)	55. Wire Rope Wrapping on Drum (1/2" flange)				A - B30.5-1.7.6	72. Safety Latch			
A - B30.5-1.3.2(2)(a)	56. Wire Rope Minimum (2) Rope Wraps				A - B30.5-1.7.4(a)	73. Sheave			
Wire Rope					A- B30.10-1.10.5(f)	74. Hook Twist			
O - 1926.1413(a)(2)(i)(A)	57. Wire Rope Distortion / Damage				A - B30.10-1.10.5(6)	75. 5% Hook Throat Opening			
O - 1926.1413(a)(2)(i)(B)	58. Corrosion				A - B30.10-1.10.5(e)	76. 10% Hook Wear			
O - 1926.1413(a)(2)(i)(C)	59. Electrical / Heat Damage				O - 1926.1412(d)(1)(v)	77. Hook Swivel			
O - 1926.1413(a)(2)(ii)(A)	60. Broken Wires				A - B30.5-1.7.6	78. Capacity Markings			
O - 1926.1413(a)(2)(ii)(b)	61. Diameter Reduction				A - B30.5-1.7.6	79. Weight Marking			
Historical Data					A - B30.5-1.7.4(b)	80. Wire Rope Retainer (Close Fitting Guard)			
O - 1926.1412(e)(3)	Monthly Inspection Reports				A - B30.5-2.1.3(d)	81. Pin for Load Block			
O - 1926.1412(f)(1)	Annual Inspection Reports								
A - B30.5-2.3.1(a)	Maintenance Records								
A - B30.5-2.3.3	Repair/Adjustment Records								
A - B30.5-2.2.2(a)	Load Test Reports								



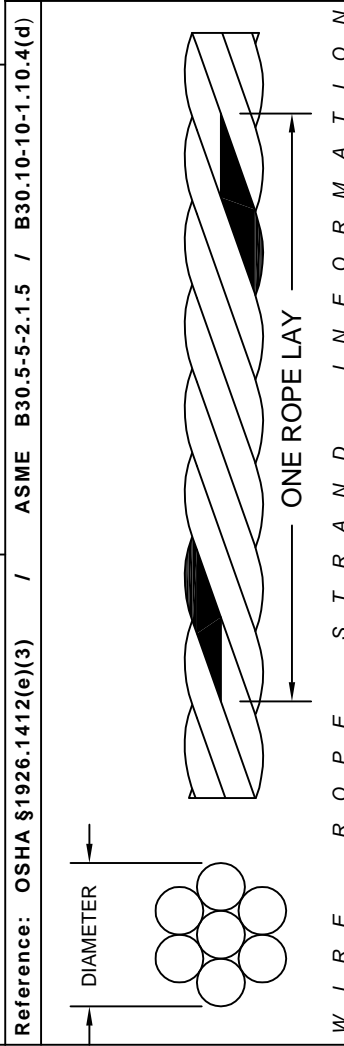
VENCO VENTURO INDUSTRIES LLC  
CINCINNATI, OHIO

TITLE  
**CRANE INSP. CHKLST**  
**CRANES**

DATE  
**06-10-16A**  
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**08-06-15**

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**C300**  
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CUSTOMER	ROPE DESCRIPTION	MFR. BREAKING STRENGTH	APPLICATION		
JOB #	HOOB MFR.	ID #	CAPACITY	HOOK-TWIST	THROAT DIM.



 VENTURO INDUSTRIES LLC CINCINNATI, OHIO	TITLE <b>MONTHLY / ANNUAL INSPECTION REPORT</b>		DATE <b>08-06-15</b>	SECTION <b>C300</b>
	<b>CRANES</b>		SUPERSEDES	<b>23080</b>





# **OSHA 1910.180 REFERENCE**

**Crawler locomotive and truck cranes. - 1910.180**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1910
- Part Title: Occupational Safety and Health Standards
- Subpart: N
- Subpart Title: Materials Handling and Storage
- Standard Number: 1910.180
- Title: Crawler locomotive and truck cranes

## a) "Definitions applicable to this section."

- 1) A "crawler crane" consists of a rotating superstructure with power plant, operating machinery, and boom, mounted on a base, equipped with crawler treads for travel. Its function is to hoist and swing loads at various radii.
- 2) A "locomotive crane" consists of a rotating superstructure with power-plant, operating machinery and boom, mounted on a base or car equipped for travel on railroad track. It may be self-propelled or propelled by an outside source. Its function is to hoist and swing loads at various radii.
- 3) A "truck crane" consists of a rotating superstructure with powerplant, operating machinery and boom, mounted on an automotive truck equipped with a powerplant for travel. Its function is to hoist and swing loads at various radii
- 4) A "wheel mounted crane" (wagon crane) consists of a rotating superstructure with powerplant, operating machinery and boom, mounted on a base or platform equipped with axles and rubber-tired wheels for travel. The base is usually propelled by the engine in the superstructure, but it may be equipped with a separate engine controlled from the superstructure. Its function is to hoist and swing loads at various radii
- 5) An "accessory" is a secondary part or assembly of parts which contributes to the overall function and usefulness of a machine.
- 6) "Appointed" means assigned specific responsibilities by the employer or the employer's representative.
- 7) "ANSI" means the American National Standards Institute.
- 8) An "angle indicator" [boom] is an accessory which measures the angle of the boom to the horizontal.
- 9) The "axis of rotation" is the vertical axis around which the crane superstructure rotates.
- 10) "Axle" means the shaft or spindle with which or about which a wheel rotates. On truck- and wheel-mounted cranes it refers to an automotive type of axle assembly including housings, gearing, differential, bearings, and mounting appurtenances.
- 11) "Axle" [bogie] means two or more automotive-type axles mounted in tandem in a frame so as to divide the load between the axles and permit vertical oscillation of the wheels.
- 12) The "base" (mounting) is the traveling base or carrier on which the rotating superstructure is mounted such as a car, truck, crawlers, or wheel platform.
- 13) The "boom" [crane] is a member hinged to the front of the rotating superstructure with the outer end supported by ropes leading to a gantry or A-frame and used for supporting the hoisting tackle.
- 14) The "boom angle" is the angle between the longitudinal centerline of the boom and the horizontal. The boom longitudinal centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline.
- 15) The "boom hoist" is a hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants.
- 16) The "boom stop" is a device used to limit the angle of the boom at the highest position.
- 17) A "brake" is a device used for retarding or stopping motion by friction or power means.
- 18) A "cab" is a housing which covers the rotating superstructure machinery and/or operator's station. On truck-crane trucks a separate cab covers the driver's station.
- 19) The "clutch" is a friction, electromagnetic, hydraulic, pneumatic, or positive mechanical device for

Continued on DWG #23270



VENCO VENTURO INDUSTRIES LLC  
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TITLE

OSHA 1910.180, PG. 1

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SECTION

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SAFETY MANUAL

SUPERSEDES

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**23269**

# Crawler locomotive and truck cranes. - 1910.180

## Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1910
- Part Title: Occupational Safety and Health Standards
- Subpart: N
- Subpart Title: Materials Handling and Storage
- Standard Number: 1910.180
- Title: Crawler locomotive and truck cranes

engagement or disengagement of power.

20) The "counterweight" is a weight used to supplement the weight of the machine in providing stability for lifting working loads.

21) "Designated" means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

22) The "drum" is the cylindrical members around which ropes are wound for raising and lowering the load or boom.

23) "Dynamic" (loading) means loads introduced into the machine or its components by forces in motion.

24) The "gantry" (A-frame) is a structural frame, extending above the superstructure, to which the boom support ropes are reeved.

25) A "jib" is an extension attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles.

26) "Load" (working) means the external load, in pounds, applied to the crane, including the weight of load-attaching equipment such as load blocks, shackles, and slings.

27) "Load block" [upper] means the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended from the boom point.

28) "Load block" [lower] means the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by the hoisting ropes.

29) A "load hoist" is a hoist drum and rope reeving system used for hoisting and lowering loads.

30) "Load ratings" are crane ratings in pounds established by the manufacturer in accordance with paragraph (c) of this section.

31) "Outriggers" are extendable or fixed metal arms, attached to the mounting base, which rest on supports at the outer ends.

32) "Rail clamp" means a tong-like metal device, mounted on a locomotive crane car, which can be connected to the track.

33) "Reeving" means a rope system in which the rope travels around drums and sheaves.

34) "Rope" refers to a wire rope unless otherwise specified.

35) "Side loading" means a load applied at an angle to the vertical plane of the boom.

36) A "standby crane" is a crane which is not in regular service but which is used occasionally or intermittently as required.

37) A "standing (guy) rope" is a supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope.

38) "Structural competence" means the ability of the machine and its components to withstand the stresses imposed by applied loads.

39) "Superstructure" means the rotating upper frame structure of the machine and the operating machinery mounted thereon.

40) "Swing" means the rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.

41) "Swing mechanism" means the machinery involved in providing rotation of the superstructure.

42) "Tackle" is an assembly of ropes and sheaves arranged for hoisting and pulling.

43) "Transit" means the moving or transporting of a crane from one jobsite to another.

44) "Travel" means the function of the machine moving from one location to another, on a jobsite.

45) The "travel mechanism" is the machinery involved in providing travel.

46) "Wheelbase" means the distance between centers of front and rear axles. For a multiple axle assembly the axle center for wheelbase measurement is taken as the midpoint of the assembly.

47) The "whipline" (auxiliary hoist) is a separate hoist rope system of lighter load capacity and higher speed than provided by the main hoist.

48) A "winch head" is a power driven spool for handling of loads by means of friction between fiber or wire rope and spool.

b) "General requirements" \_

1) "Application." This section applies to crawler cranes, locomotive cranes, wheel mounted cranes of both truck and self-propelled wheel type, and any variations thereof which retain the same fundamental characteristics. This section includes only cranes of the above types, which are basically powered by internal combustion engines or electric motors and which utilize drums and ropes. Cranes designed for railway and automobile wreck clearances are excepted. The requirements of this section

Continued from DWG #23269

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VENCO VENTURO INDUSTRIES LLC  
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23270

**Crawler locomotive and truck cranes. - 1910.180**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1910
- Part Title: Occupational Safety and Health Standards
- Subpart: N
- Subpart Title: Materials Handling and Storage
- Standard Number: 1910.180
- Title: Crawler locomotive and truck cranes

are applicable only to machines when used as lifting cranes.

- 2) New and existing equipment." All new crawler, locomotive, and truck cranes constructed and utilized on or after August 31, 1971, shall meet the design specifications of the American National Standard Safety Code for Crawler, Locomotive, and Truck Cranes, ANSI B30.5-1968, which is incorporated by reference as specified in Sec. 1910.6. Crawler, locomotive, and truck cranes constructed prior to August 31, 1971, should be modified to conform to those design specifications by February 15, 1972, unless it can be shown that the crane cannot feasibly or economically be altered and that the crane substantially complies with the requirements of this section.
- 3) "Designated personnel." Only designated personnel shall be permitted to operate a crane covered by this section.
- c) "Load ratings" \_
- 1) "Load ratings - where stability governs lifting performance."

- 1) The margin of stability for determination of load ratings, with booms of stipulated lengths at stipulated working radii for the various types of crane mountings, is established by taking a percentage of the loads which will produce a condition of tipping or balance with the boom in the least stable direction, relative to the mounting. The load ratings shall not exceed the following percentages for cranes, with the indicated types of mounting under conditions stipulated in paragraphs (c)(1)(ii) and (iii) of this section.

Type of crane mounting	Maximum load ratings (percent of tipping loads)
Locomotive, without outriggers:	
Booms 60 feet or less	(1) 85
Booms over 60 feet	(1) 85
Locomotive, using outriggers fully extended	80
Crawler, without outriggers	75
Crawler, using outriggers fully extended	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

Footnote(1) Unless this results in less than 30,000 pound-feet net stabilizing moment about the rail, which shall be minimum with such booms.

- ii) The following stipulations shall govern the application of the values in paragraph (c)(1)(i) of this section for locomotive cranes:
- (a) Tipping with or without the use of outriggers occurs when half of the wheels farthest from the load leave the rail.
  - (b) The crane shall be standing on track which is level within 1 percent grade.
  - (c) Radius of the load is the horizontal distance from a projection of the axis of rotation to the rail support surface, before loading, to the center of vertical hoist line or tackle with load applied.
  - (d) Tipping loads from which ratings are determined shall be applied under static conditions only, i.e., without dynamic effect of hoisting, lowering, or swinging.
  - (e) The weight of all auxiliary handling devices such as hoist blocks, hooks, and slings shall be considered a part of the load rating.
- iii) Stipulations governing the application of the values in paragraph (c)(1)(i) of this section for crawler, truck, and wheel-mounted cranes shall be in accordance with Crane Load-Stability Test Code, Society of Automotive Engineers (SAE) J765, which is incorporated by reference as specified in Sec. 1910.6.
- iv) The effectiveness of these preceding stability factors will be influenced by such additional factors as freely suspended loads, track, wind, or ground conditions, condition and inflation of rubber tires, boom lengths, proper operating speeds for existing conditions, and, in general, careful and

Continued from DWG #23270

Continued on DWG #23272



VENCO VENTURO INDUSTRIES LLC  
CINCINNATI, OHIO

TITLE  
OSHA 1910.180, PG. 3

SAFETY MANUAL

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SECTION

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23271

**Crawler locomotive and truck cranes. - 1910.180**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1910
- Part Title: Occupational Safety and Health Standards
- Subpart: N
- Subpart Title: Materials Handling and Storage
- Standard Number: 1910.180
- Title: Crawler locomotive and truck cranes

competent operation. All of these shall be taken into account by the user.

- 2) "Load rating chart." A substantial and durable rating chart with clearly legible letters and figures shall be provided with each crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his control station.
- d) "Inspection classification" \_
- 1) "Initial inspection." Prior to initial use all new and altered cranes shall be inspected to insure compliance with provisions of this section.
- 2) "Regular inspection." Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as "frequent" and "periodic", with respective intervals between inspections as defined below:
- i) Frequent inspection: Daily to monthly intervals.
- ii) Periodic inspection: 1- to 12- month intervals, or as specifically recommended by the manufacturer.
- 3) "Frequent inspection." Items such as the following shall be inspected for defects at intervals as defined in paragraph (d)(2)(i) of this section or as specifically indicated including observation during operation for any defects which might appear between regular inspections. Any deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard:
- i) All control mechanisms for maladjustment interfering with proper operation: Daily.
- ii) All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- iii) All safety devices for malfunction.
- iv) Deterioration or leakage in air or hydraulic systems: Daily.
- v) Crane hooks with deformations or cracks. For hooks with cracks or having more than 15 percent in excess of normal throat opening or more than 10 deg. twist from the plane of the unbent hook.
- vi) Rope reeving for noncompliance with manufacturer's recommendations.
- vii) Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
- 4) "Periodic inspection." Complete inspections of the crane shall be performed at intervals as generally defined in paragraph (d)(2)(ii) of this section depending upon its activity, severity of service, and environment, or as specifically indicated below. These inspections shall include the requirements of paragraph (d)(3) of this section and in addition, items such as the following. Any deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard:
- i) Deformed, cracked, or corroded members in the crane structure and boom.
- ii) Loose bolts or rivets.
- iii) Cracked or worn sheaves and drums.
- iv) Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices.
- v) Excessive wear on brake and clutch system parts, linings, pawls, and ratchets.
- vi) Load, boom angle, and other indicators over their full range, for any significant inaccuracies.
- vii) Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements.
- viii) Excessive wear of chain-drive sprockets and excessive chain stretch.
- ix) Travel steering, braking, and locking devices, for malfunction.
- x) Excessively worn or damaged tires.
- 5) "Cranes not in regular use."
- i) A crane which has been idle for a period of one month or more, but less than 6 months, shall be given an inspection conforming with requirements of paragraph (d)(3) of this section and paragraph (g)(2)(ii) of this section before placing in service.
- ii) A crane which has been idle for a period of six months shall be given a complete inspection conforming with requirements of paragraphs (d) (3) and (4) of this section and paragraph (g)(2)(ii) of this section before placing in service.
- iii) Standby cranes shall be inspected at least semiannually in accordance with requirements of paragraph (d)(3) of this section and paragraph (g)(2)(ii) of this section. Such cranes which are

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**23272**

**Crawler locomotive and truck cranes. - 1910.180**Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1910
- Part Title: Occupational Safety and Health Standards
- Subpart: N
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exposed to adverse environment should be inspected more frequently.

- 6) "Inspection records." Certification records which include the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the crane which was inspected shall be made monthly on critical items in use such as brakes, crane hooks, and ropes. This certification record shall be kept readily available.
- e) "Testing" \_
- 1) "Operational tests."
- i) In addition to prototype tests and quality-control measures, each new production crane shall be tested by the manufacturer to the extent necessary to insure compliance with the operational requirements of this paragraph including functions such as the following:
- (a) Load hoisting and lowering mechanisms
  - (b) Boom hoisting and lower mechanisms.
  - (c) Swinging mechanism
  - (d) Travel mechanism
  - (e) Safety devices.
- ii) Where the complete production crane is not supplied by one manufacturer such tests shall be conducted at final assembly.
- iii) Certified production-crane test results shall be made available.
- 2) "Rated load test."
- i) Written reports shall be available showing test procedures and confirming the adequacy of repairs or alterations.
- ii) Test loads shall not exceed 110 percent of the rated load at any selected working radius.
- iii) Where rerating is necessary:
- (a) Crawler, truck, and wheel-mounted cranes shall be tested in accordance with SAE Recommended Practice, Crane Load Stability Test Code J765 (April 1961).
  - (b) Locomotive cranes shall be tested in accordance with paragraph (c)(1) (i) and (ii) of this section.
  - (c) Rerating test report shall be readily available.
- iv) No cranes shall be rerated in excess of the original load ratings unless such rating changes are approved by the crane manufacturer or final assembler.
- f) "Maintenance procedure" - "General." After adjustments and repairs have been made the crane shall not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.
- g) "Rope inspection." \_
- 1) "Running ropes." A thorough inspection of all ropes in use shall be made at least once a month and a certification record which includes the date of inspection, the signature of the person who performed the inspection and an identifier for the ropes shall be prepared and kept on file where readily available. All inspections shall be performed by an appointed or authorized person. Any deterioration, resulting in appreciable loss of original strength shall be carefully observed and determination made as to whether further use of the rope would constitute a safety hazard. Some of the conditions that could result in an appreciable loss of strength are the following:
- i) Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
  - ii) A number of broken outside wires and the degree of distribution of concentration of such broken wires.
  - iii) Worn outside wires.
  - iv) Corroded or broken wires at end connections.
  - v) Corroded, cracked, bent, worn, or improperly applied end connections.
  - vi) Severe kinking, crushing, cutting, or unstranding
- 2) "Other ropes."
- i) Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Particular care shall be taken to inspect ropes at these locations.

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- ii) All rope which has been idle for a period of a month or more due to shutdown or storage of a crane on which it is installed shall be given a thorough inspection before it is used. This inspection shall be for all types of deterioration and shall be performed by an appointed or authorized person whose approval shall be required for further use of the rope. A certification record which includes the date of inspection, the signature of the person who performed the inspection, and an identifier for the rope which was inspected shall be prepared and kept readily available.
- iii) Particular care shall be taken in the inspection of nonrotating rope.
- h) "Handling the load" –
- 1) "Size of load."
- i) No crane shall be loaded beyond the rated load, except for test purposes as provided in paragraph (e) of this section.
- ii) When loads which are limited by structural competence rather than by stability are to be handled, it shall be ascertained that the weight of the load has been determined within plus or minus 10 percent before it is lifted.
- 2) "Attaching the load."
- i) The hoist rope shall not be wrapped around the load.
- ii) The load shall be attached to the hook by means of slings or other approved devices.
- 3) "Moving the load."
- i) The employer shall assure that:
- (a) The crane is level and where necessary blocked properly.
- (b) The load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.
- ii) Before starting to hoist, the following conditions shall be noted:
- (a) Hoist rope shall not be kinked
- (b) Multiple part lines shall not be twisted around each other.
- (c) The hook shall be brought over the load in such a manner as to prevent swinging.
- iii) During hoisting care shall be taken that:
- (a) There is no sudden acceleration or deceleration of the moving load.
- (b) The load does not contact any obstructions.
- iv) Side loading of booms shall be limited to freely suspended loads. Cranes shall not be used for dragging loads sideways.
- v) No hoisting, lowering, swinging, or traveling shall be done while anyone is on the load or hook.
- vi) The operator should avoid carrying loads over people.
- vii) On truck-mounted cranes, no loads shall be lifted over the front area except as approved by the crane manufacturer.
- viii) The operator shall test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes.
- ix) Outriggers shall be used when the load to be handled at that particular radius exceeds the rated load without outriggers as given by the manufacturer for that crane. Where floats are used they shall be securely attached to the outriggers. Wood blocks used to support outriggers shall:
- (a) Be strong enough to prevent crushing.
- (b) Be free from defects.
- (c) Be of sufficient width and length to prevent shifting or toppling under load.
- x) Neither the load nor the boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums.
- xi) Before lifting loads with locomotive cranes without using outriggers, means shall be applied to prevent the load from being carried by the truck springs.
- xii) When two or more cranes are used to lift one load, one designated person shall be responsible for the operation. He shall be required to analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.
- xiii) In transit the following additional precautions shall be exercised:
- (a) The boom shall be carried in line with the direction of motion.
- (b) The superstructure shall be secured against rotation, except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.
- (c) The empty hook shall be lashed or otherwise restrained so that it cannot swing freely.

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- xiv) Before traveling a crane with load, a designated person shall be responsible for determining and controlling safety. Decisions such as position of load, boom location, ground support, travel route, and speed of movement shall be in accord with his determinations.
- xv) A crane with or without load shall not be traveled with the boom so high that it may bounce back over the cab.
- xvi) When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radii at which it can be controlled. A tag or restraint line shall be used when rotation of the load is hazardous.
- xvii) When a crane is to be operated at a fixed radius, the boom-hoist pawl or other positive locking device shall be engaged.
- xviii) Ropes shall not be handled on a winch head without the knowledge of the operator.
- xix) While a winch head is being used, the operator shall be within convenient reach of the power unit control lever.
- 4) "Holding the load."
- i) The operator shall not be permitted to leave his position at the controls while the load is suspended.
- ii) No person should be permitted to stand or pass under a load on the hook.
- iii) If the load must remain suspended for any considerable length of time, the operator shall hold the drum from rotating in the lowering direction by activating the positive controllable means of the operator's station.
- i) "Other requirements" \_
- 1) "Rail clamps." Rail clamps shall not be used as a means of restraining tipping of a locomotive crane.
- 2) "Ballast or counterweight." Cranes shall not be operated without the full amount of any ballast or counterweight in place as specified by the maker, but truck cranes that have dropped the ballast or counterweight may be operated temporarily with special care and only for light loads without full ballast or counterweight in place. The ballast or counterweight in place specified by the manufacturer shall not be exceeded.
- 3) "Cabs."
- i) Necessary clothing and personal belongings shall be stored in such a manner as to not interfere with access or operation.
- ii) Tools, oil cans, waste, extra fuses, and other necessary articles shall be stored in the tool box, and shall not be permitted to lie loose in or about the cab.
- 4) "Refueling."
- i) Refueling with small portable containers shall be done with an approved safety type can equipped with an automatic closing cap and flame arrester. Refer to 1910.155(c)(3) for definition of approved.
- ii) Machines shall not be refueled with the engine running
- 5) "Fire extinguishers."
- i) A carbon dioxide, dry chemical, or equivalent fire extinguisher shall be kept in the cab or vicinity of the crane.
- ii) Operating and maintenance personnel shall be made familiar with the use and care of the fire extinguishers provided.
- 6) "Swinging locomotive cranes." A locomotive crane shall not be swung into a position where railway cars on an adjacent track might strike it, until it has been ascertained that cars are not being moved on the adjacent track and proper flag protection has been established.
- j) "Operations near overhead lines" \_
- 1) For operations near overhead electric lines, see 1910.333(c)(3).

[39 FR 23502, June 27, 1974, as amended at 49 FR 5323, Feb. 10, 1984; 51 FR 34561, Sept. 29, 1986; 53 FR 12122, Apr. 12, 1988; 55 FR 32015, Aug. 6, 1990; 61 FR 9227, March 7, 1996]

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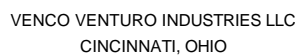
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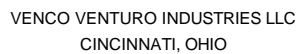
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