

**PROMULGATION OF AMENDMENT TO THE BUILDING  
CODE REFERENCE STANDARD RS 19-2 IN RELATION TO  
POWER OPERATED CRANES AND DERRICKS**

*PURSUANT TO Chapter 26 of the New York City Charter and Section 27-131.1 of the Administrative Code of the City Of New York, and in accordance with the requirements of 1 RCNY §37-01(e), this proposed reference standard amendment was previously published in the City Record on August 4, 2006 and a public hearing was held on August 29, 2006 pursuant to 1 RCNY §37-01(f). The Department of Buildings hereby adopts the amendment to the NYC Building Code Reference Standard RS 19-2 relating to power operated cranes and derricks.*

Date: September 14, 2006  
New York, New York

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Patricia J. Lancaster, FAIA  
Commissioner

**New material is underlined**  
**Material in [brackets] is existing text to be deleted**  
*Italicized text describe revisions*  
**\*\*\*Denotes unchanged text**

**\*\*REFERENCE STANDARD RS -19  
SAFETY OF PUBLIC AND PROPERTY DURING CONSTRUCTION OPERATIONS**

§1. The list of referenced national standards at the beginning of Reference Standard RS-19 Safety of Public and Property during Construction Operations of the appendix to chapter 1 of title 27 of the administrative code is hereby amended as follows:

**\* LIST OF REFERENCED NATIONAL STANDARDS**

ANSI A10.3 Power Actuated Fastening Systems- Safety Requirements, as Modified..... 1985  
ANSI A10.11 American national standard for personnel and debris nets used during construction,  
repair and demolition operations, as modified.....1989  
ANSI B30.5 Mobile and Locomotive Cranes - Chapter 5-1 except Section 5-1.9.9 .....2000  
ANSI B30.5 Mobile and Locomotive Cranes - Chapter 5-1 except Section 5-1.9.9 .....1994  
ANSI B30.5 Mobile and Locomotive Cranes - Chapter 5-1 except Section 5-1.9.9 .....1989

<u>ANSI B30.5 Mobile and Locomotive Cranes - Chapter 5-1 except Section 5-1.9.9 .....</u>	<u>1982</u>
<u>ANSI B30.5 Mobile and Locomotive Cranes - Chapter 5-1 except Section 5-1.9.9 .....</u>	<u>2004</u>
<u>ANSI B30.5 Mobile and Locomotive Cranes .....</u>	<u>1968</u>
<u>CEN EN 13000 Cranes –Mobile Cranes, except Section 4.2.6 .....</u>	<u>2004</u>

**HISTORY:**

**\* Amended by the Department of Buildings, Effective Date: October 1, 2006;**  
*Local Law 61-1987; 111-90 BCR; 234-90 BCR; 1155-80 BCR*

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§2. Reference Standard RS-19-2 Power Operated Cranes and Derricks of the appendix to chapter 1 of title 27 of the administrative code is hereby amended as follows:

**\*\*RS 19-2 POWER OPERATED CRANES AND DERRICKS**

**1.0 Scope.**-This standard applies to the construction, installation, inspection, maintenance and use of power operated cranes and derricks used for hoisting and/or rigging purposes; or used for the construction, alteration, demolition, excavation and maintenance purposes, including highways or sewers; or used for the installation of piles; or used for the hoisting or lowering of any article on the outside of any building or structure.

1.1 Exemptions.-Exempt from the requirements of this reference standard are the following:

1.1.1 Cranes or derricks used in industrial or commercial plants or yards and floating cranes, floating derricks and cranes and derricks used on floating equipment. Also augers, churn-drills and other drilling equipment. Operators of such equipment shall be exempt from any licensing requirements.

1.1.2 Operators of cranes described in section C26-1909.4(a)(3) and (4) of the administrative code shall be exempt from any licensing requirements where the cranes are used in connection with the installation or maintenance of street lighting or public utility overhead power distribution systems.

1.1.3 Derricks having a maximum rated capacity not exceeding one ton.

**2.0 Definitions.-**

**2.1 ACCESSORY.**-A secondary part of assembly of parts which contributes to the overall function and usefulness of a machine.

**2.2 APPOINTED.**-Assigned specific responsibilities by the employer or by the employers representative.

**2.3 ANGLE INDICATOR (boom).**-An accessory which measures the angle of the boom to the horizontal.

**2.4 AUXILIARY HOIST.**-(See Whipline).

**2.5 AXIS OF ROTATION.**-The vertical axis around which the crane superstructure rotates.

**2.6 AXLE.**-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 housing, gearing, differential, bearings and mounting appurtenances.

**2.7 AXLE (bogie).**-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.

**2.8 BASE (mounting).**The base or carrier on which the rotating superstructure is mounted such as a truck, crawler or platform.

**2.9 BOOM.**A timber or metal section or strut. The heel (lower end) is affixed to a base, carriage or support, and the upper end supports a cable and sheaves where the load is lifted by means of wire rope and hook.

**2.10 BOOM ANGLE.** 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.

**2.11 BOOM HARNESS.** The block and sheave arrangement on the boom point to which the topping lift cable is reeved for lowering and raising the boom.

**2.12 BOOM HOIST.**-A hoist drum and rope reeving system used to raise and lower the boom.

**2.13 BOOM POINT.**-The outward end of the top section of the boom.

**2.14 BOOM STOP.**-A device used to limit the angle of the boom at the highest position.

**2.15 BRAKE.**-A device used for retarding or stopping motion by friction or power means.

**2.16 CAB.**-A housing which covers the rotating superstructure machinery and/or operators station.

**2.16. 1 CABLEWAY.**-A power operated system for moving loads in a generally horizontal direction in which the loads are conveyed on an overhead cable, track or carriage.

**2.16.2 CLIMBER CRANE.**-A crane erected upon and supported by a building or other structure which may be raised or lowered to different floors or levels of the building or structure.

**2.17 CLUTCH.**-A friction, electromagnetic, hydraulic, pneumatic or positive mechanical device for engagement of power.

**2.18 COUNTERWEIGHT.**-Weight used to supplement the weight of the machine in providing stability for lifting working loads.

**2.19 CRANE.**-A power operated machine for lifting or lowering a load and moving it horizontally which utilizes wire rope and in which the hoisting mechanism is an integral part of the machine.

**2.20 CRAWLER CRANE.**-A crane consisting of a rotating superstructure with power plant, operating machinery and boom, mounted on a base, equipped with crawler treads for travel.

**2.21 DERRICK.**-An apparatus consisting of a mast or equivalent members held at the top by guys or braces, with or without a boom, for use with a hoisting mechanism and operating rope, for lifting or lowering a load and moving it horizontally.

**2.21.1 A-FRAME DERRICK.**-A derrick in which the boom is hinged from a cross member between the bottom ends of two upright members spread apart at the lower ends and joined at the top; the boom point secured to this junction of the side members, and the side members are braced or guyed from the junction point.

**2.21.2 BASKET DERRICK.**-A derrick without a boom, similar to a gin pole with its base supported by ropes attached to corner posts or other parts of the structure. The base is at a lower elevation than its supports. The location of the base of a basket derrick can be changed by varying the length of the rope supports. The top of the pole is secured with multiple reeved guys to position the top of the pole to the desired location by varying the length of the upper guy lines. The load is raised and lowered by ropes through a sheave or block secured to the top of the pole.

**2.21.3 BREAST DERRICK.**-A derrick without a boom. The mast consists of two side members spread farther apart at the base than at the top and tied together at top and bottom by rigid members. The mast is prevented from tipping forward by guys connected to its top. The load is raised and lowered by ropes through a sheave or block secured to the top crosspiece.

**2.21.4 CHICAGO BOOM DERRICK.**-A boom which is attached to a structure, an outside upright member of the structure serving as the mast, and the boom being stepped in a fixed socket clamped to the upright. The derrick is complete with load, boom and boom point swing line falls.

**2.21.5 GIN POLE 2 DERRICK.**-A derrick without a boom. Its guys are so arranged from its top to

permit leaning the mast in any direction. The load is raised and lowered by ropes reeved through sheaves or blocks at the top of the mast.

**2.21.6 GUY DERRICK.**-A fixed derrick consisting of a mast capable of being rotated, supported in a vertical position by guys, and a boom whose bottom end is hinged or pivoted to move in a vertical plane with a reeved rope between the head of the mast and the boom point for raising and lowering the boom, and a reeved rope from the boom point for raising and lowering the load.

**2.21.7 SHEARLEG DERRICK**-A derrick without a boom. The mast, wide at the bottom and narrow at the top, is hinged at the bottom and has its top secured by a multiple reeved guy to permit handling loads at various radii by means of load tackle suspended from the mast top.

**2.21.8 STIFFLEG DERRICK**-A derrick similar to a guy derrick except that the mast is supported or held in place by two or more stiff members, called stifflegs, which are capable of resisting either tensile or compressive forces. Sills are generally provided to connect the lower ends of the stifflegs to the foot of the mast.

**2.22 DRUM.**-The cylindrical members around which ropes are wound for raising and lowering the load or boom.

**2.23 DYNAMIC (loading).**-Loads introduced into the machine or its components by forces in motion.

**2.23.1 ENGINEER.**-The word engineer as used in these regulations shall mean a licensed professional engineer except that the certifications for matters relating to crane design may be made by an engineer licensed by any state or foreign jurisdiction or upon proof, to the satisfaction of the commissioner, of his professional competence.

**2.23.2 FOLDING BOOM.**-A boom constructed of hinged sections which is articulated in a folding manner and may be folded for storage or transit.

**2.24 GANTRY(A-Frame)**-A structural frame, extending above the superstructure of a mobile crane, to which the boom supports ropes are reeved.

**2.25 GUDGEON PIN.**-A pin connecting the mast cap to the mast, allowing rotation of the mast.

**2.26 GUY.**-A rope used to steady or secure the mast or other members in the desired position.

**2.26.1. HOISTING MACHINE**-A power operated machine used for lifting or lowering a load, utilizing a drum and wire rope, excluding elevators. This shall include but not be limited to a crane, derrick, and cableway.

**2.26.2 HYDRAULIC BOOM.**-A boom which is operated by means of a hydraulic system.

**2.27 JIB.**-An extension attached to the boom point to provide added boom length for lifting specified loads. This jib may be in line with the boom or offset to various angles.

**2.27.1 LAY.**-That distance measured along a cable in which one strand makes a complete revolution around the cable axis.

**2.28 LOAD (working).**-The external load, in pounds, applied to the crane or derrick, including the weight of auxiliary load attaching equipment such as load blocks, shackles, and slings.

**2.29 LOAD BLOCK (upper).**-The assembly of hook or shackle, swivel, sheaves, pins, and frame suspended from the boom point.

**2.30 LOAD BLOCK (lower).**-The assembly of hook or shackle, swivel, sheaves, pins and frame suspended by the hoisting ropes.

**2.31 LOAD HOIST.**-A hoist drum and rope reeving system used for hoisting and lowering loads.

***Section 2.31.1 shall be added as follows:***

**2.31.1 LOAD INDICATOR.** - A device that measures the weight of the load.

**2.32 LOAD RATINGS.**-Maximum loads that may be lifted by a crane or derrick at various angles and positions as approved by the department.

**2.33 MAST.**-The upright member of a derrick.

**2.33.1 MOBILE CRANE.**-A crawler crane; a truck crane; or a wheel mounted crane.

**2.34 OUTRIGGERS.**-Extendable or fixed metal arms, attached to the mounting base, which rests on supports at the outer ends.

*Section 2.34.1 shall be added as follows:*

**2.34.1 QUALIFIED PERSON.** - A person who by possession of a recognized degree, certificate or professional standing or who by knowledge, training and experience has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

*Section 2.34.2 shall be added as follows:*

**2.34.2 RATED CAPACITY INDICATOR.** - A device that automatically monitors radius, load weight, and load rating and warns the crane operator of an overload condition.

*Section 2.34.3 shall be added as follows:*

**2.34.3 RATED CAPACITY (LOAD) LIMITER.** - A device that automatically monitors radius, load weight, and load rating and prevents movements of the crane which would result in an overload condition.

**2.35 REEVING.**-A rope system in which the rope travels around drums and sheaves.

**2.36 ROPE.**-Refers to wire rope unless otherwise specified.

**2.37 SIDE LOADING.**-A load applied at an angle to the vertical plane of the boom.

**2.38 SILL.**-A member connecting the foot block and stifle or a member connecting the lower ends of a double member mast.

**2.39 STANDING (GUY) ROPE.**-A supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope.

**2.40 STRUCTURAL COMPETENCE.**-The ability of the machine and its component to withstand the stresses imposed by applied loads.

**2.41 SUPERSTRUCTURE.** The rotating upper frame structure of the machine and the operating machinery mounted thereon.

**2.42 SWING.** Rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.

**2.43 SWING MECHANISM.** The machinery involved in providing rotation of the superstructure.

**2.44 TACKLE.** An assembly of ropes and sheaves arranged for hoisting and pulling.

**2.44.1 TELESCOPIC BOOM.**A boom constructed of sections of diminishing cross sections in which the sections fit within each other. The boom may be extended in a manner similar to a telescope.

**2.44.2 TOWER CRANE.**-A crane in which a boom, swinging jib or other structural member is mounted upon a vertical mast or tower.

**2.45 TRANSIT.**-The moving or transporting of a crane from one job site to another.

**2.46 TRAVEL.**-The function of the machine moving from one location to another, on a job site.

**2.47 TRAVEL MECHANISM.**-The machinery involved in providing travel power.

**2.48 TRUCK CRANE.**-A crane consisting of a rotating superstructure with power plant, operating machinery and boom, mounted on an automotive truck equipped with a power plant for travel.

**2.48.1 TRUCK MOUNTED TOWER CRANE.**-A tower crane which is mounted on a truck or similar carrier for travel or transit.

*Section 2.48.2 shall be added as follows:*

**2.48.2 TWO-BLOCKING.** - A condition in which the lower load block or hook assembly comes into contact with the upper load block or boom point sheave assembly.

**2.49 WHEEL BASE.**-Distance between centers of front and rear axles. For a multiple axle assembly the axle center wheel base measurement is taken as the midpoint of the assembly.

**2.50 WHEEL MOUNTED CRANE** (wagon crane).-A crane consisting of a rotating superstructure with power plant, 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.

**2.51 WHIPLINE** (auxiliary hoist).-A separate hoist rope system of lighter load capacity and higher speed than provided by the main hoist.

**2.52 WINCH HEAD.**-A power driven spool for handling of loads by means of friction between fiber or wire rope and spool.

*Section 3.0 deleted in its entirety as follows and replaced with the following:*

**[3.0 Filing Applications-for Approval and Operation of Cranes and Derricks.-**

\* 3.1.1 The following information shall be submitted by an engineer:

1. Design calculations for:

- (a) Boom or mast
- (b) Jib or extensions
- (c) Gantries
- (d) Counterweight supports and attachments
- (e) Rope
- (f) Overturning stability

Only items (a), (b) and (e) of this subparagraph shall apply to derricks.

2. Load test reports where required under this reference standard.

3. A material specification statement certifying the type of steel used in the construction of items (a) through (e) of subparagraph one above.

4. A list of standards used in design and testing.

5. The requirements of subparagraphs one through four above shall be waived for cranes where such information is not available, provided that the equipment satisfies the load test requirements of section 7.0 of this reference standard, which shall apply to the following categories:

(a) Cranes which had a certificate of inspection on or after January 1, 1965.

(b) Cranes manufactured on or April 1, 1962 and prior to April 1, 1970 provided that:

(1) The application is filed with the department of buildings and a certificate of approval is obtained within two years after the enactment of this local law, and

(2) Title to the crane has been in name of the applicant since December 31, 1971.

6. Where cranes manufactured after April 1, 1970 have been tested pursuant to subdivision 6.1 of this reference standard, the requirements of paragraph 3.1.1 above shall be waived, provided that:

(a) The tests are monitored and certified by a competent individual or group, other than the manufacturer, acceptable to the commissioner, or

(b) At the discretion of the commissioner, the tests are monitored and certified by the department, or

(c) In lieu of the monitoring and certification of the tests as provided in items (a) and (b) above, the commissioner shall require design calculations for those items in paragraph 3.1.1 as he shall deem necessary to supplement the tests and reference standard RS 10-5 need not apply.

*\*Local Law 50-1973]*

**3.0 Filing Applications for Approval and Operation of Cranes and Derricks. -**

**3.1 Certificate of approval.** -The application for a certificate of approval required by Subchapter 19, Article 10 of the New York City Building Code shall be filed by an engineer and shall include the following information:

1. Affidavit of compliance from the manufacturer as detailed in section 3.2 below,
2. Operator’s manual showing all configurations for which the engineer is seeking approval, general equipment specifications and manufacturer’s recommended maintenance procedures,
3. An advertising brochure or drawing showing the general configuration and specifications for which the engineer is seeking approval,
4. Load rating chart with chart number and page numbers for identification,
5. Certification from the engineer that he/she has reviewed the manufacturer’s design calculations and testing or has prepared sufficient calculations, as prescribed in section 3.2 below and found that the design of the derrick or crane conforms to the New York City Building Code, and
6. Any supporting data, drawings, or calculations upon request.

**Exception: Third party certification:** In lieu of the engineer’s certification of the design calculations, the engineer may submit a third-party certification by a competent individual or organization, other than the manufacturer, acceptable to the commissioner stating that the tests specified in section 4.2 below were monitored and certified.

**3.2 Affidavit of compliance.** - The affidavit of compliance from the manufacturer shall include the following:

1. List of all components; maximum boom length, maximum jib(s) length, maximum length of all other attachments,
2. List of all counterweight combinations,
3. List of standards used in the design of the boom and/or mast,
4. List of standards used in the design of the jib and/or extensions,
5. List of standards used in the design of the boom support system,
6. List of standards used in the design of the counterweight support system and attachments,
7. List of standards used in the design of the rope,
8. List of standards used in design of overturning stability,
9. List of standards used in the prototype testing, and
10. List of material(s) and material specifications used in the components listed in Numbered Items 3-7 above.

**Exception to required items:** Numbered items 2, 6, 8, and 9 above are not required for derricks.

*Section 4.0 shall be deleted in its entirety as follows and replaced with the following:*

[\* **4.0 Design of Boom and Other Structural Members.**-The boom shall be designed as a beam column, subject simultaneously to axial force, torsion and bending. Stresses induced in the boom by its movement and due to wind during normal operation shall be considered. Stresses of the boom or other structural members enumerated in 1 of 3.1.1 shall not exceed those permitted by reference standard RS 10-5 for mobile cranes with hydraulic booms, for derricks and for tower and climber cranes.

*\*Local Law 50-1973]*

**4.0 Design, construction, and testing of mobile cranes. -**

#### **4.1 Design and construction of mobile cranes.-**

**4.1.1 Design and construction of mobile cranes manufactured and submitted prior to October 1, 2006.** Mobile cranes, and their components, manufactured and submitted prior to October 1, 2006 shall, in their entirety, be designed and constructed in accordance with ANSI B30.5 – 1968.

**4.1.2 Design and construction of mobile cranes manufactured and submitted on or after October 1, 2006.** Mobile cranes, and their components, manufactured and submitted on or after October 1, 2006, shall, in their entirety, be designed and constructed in accordance with one of the following standards:

1. ANSI B30.5 – 2004 Chapter 5-1 except Section 5-1.9.9
2. CEN EN 13000 (2004) except Section 4.2.6

**4.1.3 Design and construction of mobile cranes manufactured prior to October 1, 2006 but submitted after October 1, 2006.** Mobile cranes, and their components, submitted on or after October 1, 2006, but manufactured before October 1, 2006, shall, in their entirety, be designed and constructed in accordance with one of the following standards:

1. ANSI B30.5 – 2004 Chapter 5-1 except Section 5-1.9.9
2. ANSI B30.5 – 2000 Chapter 5-1 except Section 5-1.9.9
3. ANSI B30.5 – 1994 Chapter 5-1 except Section 5-1.9.9
4. ANSI B30.5 – 1989 Chapter 5-1 except Section 5-1.9.9
5. ANSI B30.5 – 1982 Chapter 5-1 except Section 5-1.9.9
6. CEN EN 13000 (2004) except Section 4.2.6
7. Such other standard as the Commissioner deems appropriate.

#### **4.2 Prototype testing of mobile cranes. -**

**4.2.1 Prototype testing of mobile cranes submitted prior to October 1, 2006.** A prototype of each mobile crane, and their components, submitted before October 1, 2006 shall be tested for strength and stability in accordance with ANSI B30.5-1968. Lattice boom cranes shall also be tested in accordance with SAE J987 and all mobile cranes with lattice or hydraulic booms shall also be tested in accordance with SAE J765.

**4.2.2 Prototype testing of mobile cranes submitted on or after October 1, 2006.** A prototype of each mobile crane, and their components, submitted on or after October 1, 2006 shall meet the prototype testing requirements in Test Option A or Test Option B as outlined below:

##### 1. Test Option A:

- (a) The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): All tests listed in SAE J1063 - 1993, Table 1, shall be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J1063 - 1993, Table 2 shall be met.
  - (b) The following applies to equipment with pendant supported lattice booms: All the tests listed in SAE J987 - 2003, Table 1, shall be performed to load all critical structural elements to their respective limits. All the strength margins listed in SAE J987 – 2003, Table 2 shall be met.
  - (c) Load rating charts shall be established by tests performed in accordance with SAE J765 - 1990, Crane Load Stability Test.
2. Test Option B:



- (a) The following applies to equipment with cantilevered booms (such as hydraulic boom cranes): The analysis methodology, such as computer modeling, must demonstrate that all load cases listed in SAE J1063 - 1993 meet the strength margins listed in SAE J1063-1993 Table 2.
- (b) The following applies to equipment with pendant supported lattice booms: The analysis methodology, such as computer modeling, must demonstrate that all load cases listed in SAE J987 - 2003 meet the strength margins listed in SAE J987- 2003 Table 2.
- (c) The analysis methodology, such as computer modeling, must demonstrate that the load chart ratings meet the requirements of SAE J765 - 1990.
- (d) Analysis verification. The physical testing requirements under SAE J1063 - 1993 and SAE J987 - 2003 must be met unless the reliability of the analysis methodology, such as computer modeling, has been demonstrated by a documented history of verification through strain gauge measuring or strain gauge measuring in combination with other physical testing. The physical testing requirements of SAE J765 – 1990 must be met unless the reliability of the analysis methodology, such as computer modeling, has been demonstrated by physical testing.

*Section 5 shall be deleted in its entirety as follows:*

**[\* 5.0 Use of Special Steels.** -All steel used in the construction of a crane or derrick not specifically accepted for use by the New York City Building Code or an appropriate reference standard thereof, must be approved by the commissioner.

*\*Local Law 50-1973]*

*Section 6 shall be deleted in its entirety as follows:*

**[\* 6.0 Load Tests for New Mobile Cranes.-**

6.1 A prototype of each mobile crane, except those with hydraulic booms, manufactured after April 1, 1970 shall be tested for strength and stability in accordance with ANSI B30.5-1968 of the American National Standard Safety Code for Crawler Locomotive and Truck Cranes and in compliance with SAE J987 and SAE J765.

6.2 For mobile cranes with hydraulic booms, a prototype shall be tested in accordance with SAE J765.

6.3 Prior approval of the testing program shall be obtained from the department before performing any load tests after the effective date of this section. The department shall be notified in writing, at least one week in advance, of the date and location of such testing.]

*Section 7 shall be deleted in its entirety as follows:*

**[7.0 Load Tests for Other Mobile Cranes.-**

\* 7.1 Mobile cranes which comply with the provisions of 5 of 3.1.1 for which the information specified in 1 and 3 of 3.1.1. is not available, shall undergo a load test as follows:

1. Maximum load used shall not exceed 20,000 pounds.

2. The crane shall be tested at no more than two different radii determined by the commissioner to determine its compliance with manufacturer's load rated chart as required pursuant to these regulations. Upon satisfaction of this test requirement, the crane may be operated to the capacities represented on the chart.

*\*Local Law 50-1973*

\*\* 3. A crane tested prior to July 1, 1972 shall be deemed to comply with the requirements of

subdivision 13.1 of this standard, provided that the load ratings established by such tests are no greater than eighty (80%) percent of the test loads and in no case greater than those indicated on the manufacturer's load rating chart.

**\*\*731-71 BCR; 454-71 BCR]**

## **8.0 Certificate of On-Site Inspection.-**

### **8.1 Use of cranes and derricks at job sites. -**

8.1.1 In order to operate a crane or derrick at a job site, a certificate of on-site inspection is required as stipulated in C26-1909.4(d). The owner of the premises, building or structure, or his designated representative, shall file an application in quadruplicate at the department office in the borough where the premises is located. Such application shall be accompanied by plans showing proposed locations of the crane or derrick, pertinent features of the site such as assumed soil bearing values, ground elevations and slopes, vaults or other subsurface structures, supporting platforms or structures, and the swing of the crane or derrick. Also, a document shall be submitted, signed by a licensed engineer or registered architect which shall include the following information where the crane or derrick is to be supported by soil:

- (a) That he has inspected the soil at the proposed location or locations of the crane or derrick;
- (b) His estimate of the soil bearing value;
- (c) That he has explored the existence of any sheeting or retaining walls supporting soil adjoining any excavation which may be affected and certifies as to its adequacy;
- (d) If the crane or derrick is to be on the street, that he has explored the existence of vaults or other subsurface structures which could impair the bearing value of the street or sidewalk;
- (e) That the load imposed upon the soil by the crane or derrick including supporting platform, does not exceed such bearing value under any condition of loading.

8.1.2 Where a crane not exceeding 160 feet in height, including jibs and any other extensions to the boom is to be used for a period not exceeding 24 hours, or a crane not exceeding 50 feet in height, including jibs and any other extensions to the boom with a maximum rated capacity of 20 tons, is to be positioned on the roadway or sidewalk, a certificate of on-site inspection shall be required. However, the requirements relating to plans and a document of a licensed professional engineer or registered architect enumerated in 8.1.1 of this reference standard shall not apply nor shall the three regular working day provisions of section C26-1909.4(d) be applicable under the following conditions:

- (1) That a prototype approval has been obtained showing the means required to distribute the weight of the crane and the maximum working loads.
- (2) A statement from the owner of the structure, building or premises or his authorized agent that he visited the site and that there are no excavations or retaining walls and that no vaults or subsurface construction exists at the site.

8.1.3 A certificate of on-site inspection shall not be required under the following conditions:

\* 8.1.3.1 For a crane not exceeding 160 feet in height including jibs and any other extensions to the boom, which is to be used for a period not exceeding 48 hours and operating entirely within the property lines and in such locations which are at least a boom length, including jibs and any extensions thereof, distant from all lot lines.

*\*Local Law 50-1973*

8.1.3.2 For service cranes and clamshells operated entirely within the property lines and within such locations which do not involve the moving of any loads over the roadway or sidewalk. This exemption shall apply only to cranes with a boom length, including jibs and any extension thereof, not exceeding 110 feet.

\* 8.1.3.3 For the use of cranes as provided for in 8.1.3.1 and 8.1.3.2, notice of the operation of the

crane at the job site shall be given to the division of cranes and derricks, department of buildings, by telephone and confirmed in writing. It shall be the responsibility of an appointed person to provide firm and uniform footing and, when necessary, provide substantial timbers, cribbing or other structural members sufficient to distribute the load so as not to exceed the safe bearing capacity of the underlying material.

*\*Local Law 50-1973*

## **8.2 Cranes or Derricks Supported by a Building or Structure.-**

8.2.1 Where the crane or derrick is supported by a building or a structure, the statement by the licensed engineer or registered architect referred to in 8.1.1 shall include the means of supporting and bracing the equipment.

The swing of the crane or derrick shall be shown on the plans to insure clearance during operation. Computations shall be submitted with the application showing all reactions imposed on the structure by the crane or derrick, including those due to impact and wind. Such computations shall verify that the stability of the building or structure will not be impaired when the crane or derrick is in operation and that no structural members will be overstressed due to forces induced by the crane or derrick.

8.2.2 Concrete Structures.-If the structure is a concrete structure, test reports of the compression strength of the concrete shall be submitted to insure that the concrete supports of the crane or derrick have developed sufficient strength to support the crane or derrick before it is installed.

The means for establishing concrete strength before imposing crane or derrick loads upon the structure shall be indicated on the application.

8.2.3 All anchorages for cranes and derricks shall be approved by an appointed person.

## **8.3 Use of Pile Drivers and Clamshells.-**

8.3.1 A certificate of on-site inspection shall not be required for pile drivers or clamshells operating entirely within the lot lines under the following conditions:

8.3.1.1 Where pile driving equipment is designed or supported on a platform so that the soil bearing pressure does not exceed 500 pounds per square foot, a certificate of on-site inspection shall not be required.

8.3.1.2 Where clamshells are operating on construction sites and are at least the depth of excavation height from the edge of the excavation and where the soil bearing pressure does not exceed 500 lbs. per square foot, a certificate of on-site inspection shall not be required.

8.3.1.3 Where the pressure on the soil is in excess of 500 pounds per square foot but does not exceed 2,500 pounds per square foot, a pile driver or clamshell may be operated without a certificate of on-site inspection under the following conditions:

(1) That borings have been filed with the department in the construction application under which the work is being performed, and

(2) An amendment is filed to such application by an engineer or architect certifying that on the basis of the borings, the soil is adequate to support the load to be imposed thereon by the subject equipment.

## **8.4 The Requirements of 8.1.1, 8.2 and Sections C26-1909.4(d) Shall also Apply to Cableways.-**

**\*\***8.5 Notwithstanding the provisions of 8.0 through 8.4 where a crane is operated on the sidewalk or roadway, a permit from the department of highways shall be obtained and the pressure on such surface shall not exceed 3500 pounds per square foot. The pressure shall be distributed on the roadway by means of timber platforms extending not less than twelve (12) inches beyond the base of the outriggers on all sides and sufficiently thick to uniformly distribute the pressure as required above of all the loads including the weight of the crane. The timber mats shall have a minimum thickness of two (2) inches. All cranes equipped with steel tracks shall be supported by timber platforms not less than six inches thick and covering the entire base of the crane.

**\*\* Local Law 73-1969; 479-77 BCR**

## **9.0 Unsafe Hoisting Machines.-**

9.1 When it is found that equipment is dangerous or unsafe a notice or order to stop work may be issued by the commissioner, or his authorized representative. Such notice or order may be given to the owner or lessee of the equipment involved, or to the agent of any of them, or to the person or persons executing the work or operating the equipment in writing. If the operation of the hoisting machine is not discontinued, the inspector shall report same to his superior and an engineer shall be sent to reinspect. Upon confirmation of the unsafe condition by the engineer, the hoisting machine shall be red tagged. All persons shall be prohibited from using the said equipment until the danger is removed or the unsafe condition is rectified. An unsafe notice shall not be removed from the equipment, except by an authorized inspector or representative of the department of buildings.

**10.0 Annual Renewal of Certificate of Operation.-**Application for renewal of a certificate of operation, as stipulated in C26-1909.4 (c), shall be accompanied by inspection and maintenance records in accordance with 15.1 and 18.1. Upon approval of the application, a new certificate of operation shall be issued after a satisfactory inspection by a department inspector.

*Section 11 shall be deleted in its entirety as follows:*

### **[11.0 Welded Construction.-**

11.1 Welding of structural members of cranes and derricks enumerated in 1 and 2 of 3.1.1 shall conform to the recommended practices of the American Welding Society as outlined in specifications for welded highway and railway bridges AWS D2.0-66 or other recognized standards or pursuant to RS 19-2.

11.2 For welding of steels not covered by AWS D2.0-66, for all cranes manufactured after April 1, 1970 and all welding performed after that date shall conform to recognized standards.

11.3 The commissioner may require such welds to be tested as he deems necessary.]

*Section 12 shall be deleted in its entirety as follows:*

### **[12.0 Load Ratings and Stability of Cranes and Derricks.-**

#### **12.1 Load Ratings-Where Stability Governs Lifting Performance (Mobile Cranes).-**

12.1.1 Load ratings for mobile cranes manufactured after April 1, 1970 shall be established by tests performed in accordance with crane load stability test code, SAE J765, April, 1961.

\*12.1.2 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 shall be established at 75 percent of the load which will produce a condition of tipping or balance with the boom in the least stable direction relative to the mounting where overturning stability governs the lifting performance. The percentage may be increased to 85 percent for truck cranes which are provided with the safety devices specified in 19.1.1.

\*Local Law 50-1973]

### **13.0 Load Ratings Where Structural Competence Governs Lifting Performance.-**

*Section 13.1 shall be revised as follows:*

**13.1** [Load rating at some radii for mobile cranes and] Load ratings for climber, tower cranes and derricks are governed by structural competence. Therefore, the limitation on crane loading must be such that no structural member is overstressed, and load rating charts shall be subject to this limitation.

## 13.2 Load Rating Chart.-

### *Section 13.2.1 shall be deleted in its entirety as follows:*

[13.2.1 Mobile cranes.-A durable angle and load chart with clearly legible letters and figures shall be provided with each mobile crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his control station. The chart shall contain a full and complete range of crane load ratings, as approved by the department, at all stated operating radii and boom angles, and for all permissible boom lengths, job lengths and angles, also alternate ratings for use and non-use of optional equipment on the mobile crane, such as outriggers and counterweights which affect ratings. The chart shall also contain essential precautionary or warning notes relative to limitations on equipment and operating procedures, including indication of the least stable position. In addition, the chart shall include the following statement:

"Load ratings shown on this chart makes no allowance for such factors as the effect of freely suspended loads, wind, ground conditions, inflation of rubber tires and operating speeds. The operator therefore shall reduce load ratings in order to take these conditions into account." ]

### *Section 13.2.2 shall be deleted in its entirety as follows:*

[13.2.2 Each mobile crane, excluding those used with pile driving or dragline equipment, with a maximum rated capacity exceeding one ton shall be provided with a boom angle indicator that shall make the boom angle in degrees clearly visible to the operator at all times. Such crane, except when used with a clamshell, shall be equipped with safety devices as stipulated in 19.1(a), (c), (d) and (e).]

### *Section 13.2. 3 shall be renumbered as follows:*

13.2.1 [3] Tower and climber cranes.-A substantial, durable and clearly legible rating chart shall be provided with each tower and climber crane and securely affixed in the cab. The chart shall include load ratings approved by the department for specific lengths of components, counterweights, swing, and radii.

### *Section 14 shall be deleted in its entirety as follows:*

**[14.0 Backward Stability of Mobile Cranes.-**The backward stability of a mobile crane is its ability to resist overturning in the backward direction while in the unloaded condition. The degree of resistance to backward overturning is reflected in the margin of backward stability.

**14.1** The general conditions applicable to mobile cranes for determination of backward stability margin are as follows:

14.1.1 Crane to be equipped for normal crane operation with shortest recommended boom.

14.1.2 Boom positioned at minimum recommended radius.

14.1.3 Crane to be unloaded.

14.1.4 Outriggers free of the bearing surface unless specified by manufacturer for stationary use.

14.1.4 Crane to be standing on firm supporting surface level within one percent grade.

14.1.6 All fuel tanks at least half full.

**14.2 The following are minimum acceptable backward stability conditions for the various types of mobile cranes:**

14.2.1 Crawler cranes.-The horizontal distance between the center of gravity of the crane and the axis of rotation shall not exceed 70% of the radial distance from the axis of rotation to the backward tipping fulcrum in the least stable direction.

14.2.2 Truck and wheel mounted cranes.-

(a) With the longitudinal axis of the rotating superstructure of the crane at 90 degrees to the longitudinal axis of the carrier, the total load on all wheels on the side of the carrier under the boom shall not be less than 15 percent of the total weight of the crane.

(b) With the longitudinal axis of the rotating superstructure of the crane in line with the longitudinal axis of the carrier, in either direction, the total load on all wheels under the lighter loaded end of the carrier shall not be less than 15 percent of the total weight of the crane.]

## **15.0 Inspection Required by Owner for Cranes and Derricks.-**

**15.1 Certification and inspections required.**-The owner of a crane or derrick when applying for a certificate of approval in accordance with 3.0 shall certify that all applicable regulations regarding inspection and maintenance will be complied with. All inspections required by the owner shall be performed only by appointed personnel. The inspections shall be performed to provide information requested in a department supplied chart and all deficiencies shall be corrected. No record of information not required by such chart shall be required to be maintained in writing.

**15.2 Inspection classification.**-Inspection procedure for cranes and derricks 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 or derrick and the degrees 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:

15.2.1 Frequent inspection.-Daily to monthly intervals.

15.2.2 Periodic inspection.-1 to 12 month intervals or as specifically recommended by the manufacturer.

\***15.3 Frequent inspection.**-Items such as the following shall be inspected for defects at intervals as defined in 15.2.1 or as specifically indicated, including observation during operation for any defects which might appear between regular inspections. Any defects revealed by inspection shall be corrected. Where such defects constitute a safety hazard, the crane or derrick shall not be operated until such defects are corrected.

*\*Local Law 50-1973*

15.3.1 All control mechanisms for maladjustment interfering with proper operation.-Daily.

15.3.2 All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.

15.3.3 All safety devices for malfunction.

15.3.4 Deterioration or leakage in air or hydraulic systems.-Daily

\*15.3.5 Crane or derrick hooks with deformations or cracks.-Refer to 17.3.3(c).

*\*Local Law 50-1973*

15.3.6 Rope reeving for non-compliance with crane or derrick manufacturer's recommendations.

15.3.7 Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, moisture accumulation, weatherproofing and grounding.

15.3.8 Tension in derrick guys.-Daily.

15.3.9 Plumb of derrick mast.

15.3.10 Hoist brakes, clutches and operating levers.-Check daily for proper functioning before beginning operations.

\***15.4 Periodic inspections of cranes and derricks.**-Complete inspections of the crane or derrick shall be performed at intervals as generally defined in 15.2.2, depending upon its activity, severity of service, and environment, or as required by 15.5.1 or 15.5.2. These inspections shall include the requirements of 15.0, and in addition, items specifically indicated below. Any defects revealed by

inspection shall be corrected. Where such defects constitute a safety hazard the crane or derrick shall not be operated until such defects are corrected.

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15.4.1 Deformed, cracked or corroded members in the crane or derrick structure and boom.

15.4.2 Loose bolts or rivets.

15.4.3 Cracked or worn sheaves and drums.

15.4.4 Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices.

15.4.5 Excessive wear on brake and clutch system parts, linings, pawls and ratchets.

15.4.6 Load, boom angle and other indicators over their full range, for any significant inaccuracies.

15.4.7 Gasoline, diesel, electric or other power plants for improper performance or non-compliance with safety requirements.

15.4.8 Excessive wear of chain drive sprockets and excessive chain stretch.

15.4.9 Crane or derrick hooks.-Magnetic particle or other suitable crack detecting inspection should be performed at least once each year by an inspection agency retained by the owner and approved by the department. Certified inspection reports are to be made available to the department upon request.

15.4.10 Travel steering, braking and locking devices, for malfunction.

15.4.11 Excessively worn or damaged tires.

15.4.12 Derrick gudgeon pin for cracks, wear and distortion each time the derrick is to be erected.

15.4.13 Foundation or supports shall be inspected for continued ability to sustain the imposed loads.

#### **15.5 Cranes or derricks not in regular use.-**

##### ***Section 15.5.1 shall be revised as follows:***

15.5.1 A crane or derrick which has been idle for the period of one month or more, but less than six months, shall be given an inspection by the owner conforming with requirements of 15.3 and [18.1.3] 18.1.1 before an application for a certificate of on-site inspection in accordance with [C26-1909.4(d)] 27-1057(d) is submitted to the department.

##### ***Section 15.5.2 shall be revised as follows:***

15.5.2 A crane which has been idle for the period of over six months, shall be given a complete inspection by the owner conforming with requirements of 15.3, 15.4 and [18.13] 18.1.2 before an application for a certificate of on-site inspection in accordance with [C26-1909.4(d)] 27-1057(d) is submitted to the department.

#### **16.0 Testing Required for Cranes and Derricks, Manufactured After April 1, 1970, by Manufacturer or Owner.-**

##### **16.1 Operational test.-**

16.1.1 In addition to prototype tests and quality control measures, each new production crane and derrick shall be tested by the manufacturer to the extent necessary to insure compliance with the operational requirements of this section, including functions such as the following:

(a) Load hoisting and lowering mechanisms.

(b) Boom hoisting and lowering mechanisms.

(c) Swinging mechanism.

(d) Traveling mechanism.

(e) Safety devices.

16.1.2 Where the complete production crane or derrick is not supplied by one manufacturer such

tests shall be conducted at final assembly.

6.1.3 Operational test and production test results certified by the manufacturer or a licensed professional engineer shall be made available to the department with each application for a certificate of approval for a crane or derrick, in accordance with 3.0.

16.1.4 For all cranes and derricks, where electrically powered, the trip setting of hoist limit switches shall be determined by tests with an empty hook traveling in increasing speeds to the maximum speed. The activating mechanism of the limit switch shall be located so that it will trip the switch under all conditions in sufficient time to prevent contact of the hook or load block with any part of the derrick or crane.

## **17.0 Maintenance of Cranes and Derricks.-**

### **17.1 Preventive maintenance.-**

17.1.1 A preventive maintenance program based on the crane or derrick manufacturer's recommendations shall be established. Dated and detailed records shall be readily available to the department.

17.1.2 It is recommended that replacement parts be obtained from the original equipment manufacturer.

### **17.2 Maintenance procedure.-**

17.2.1 Before adjustments and repairs are started on a crane or derrick, the following precautions shall be taken as applicable:

- (a) Crane or derrick placed or arranged where it will cause the least interference with other equipment or operations in the area.
- (b) All controls at the "off" positions.
- (c) Starting means rendered inoperative.
- (d) Warning or "out of order" signs placed on the crane or derrick and hoist.
- (e) Power plant stopped or disconnected at take-off.
- (f) Boom lowered to the ground if possible or otherwise secured against dropping.
- (g) Lower load block lowered to the ground or otherwise secured against dropping.

17.2.2 After adjustment and repairs have been made, the crane or derrick shall not be operated until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed.

### **17.3 Adjustments and Repairs.-**

\*17.3.1 Any unsafe conditions disclosed by the inspection requirements of 15.0 shall be corrected before operation of the crane or derrick is resumed. Adjustments and repairs shall be done only by competent personnel.

*\*Local Law 50-1973*

17.3.2 Adjustments shall be maintained to assure correct functioning of components. The following are examples:

- (a) All functional operating mechanisms.
- (b) Safety devices.
- (c) Control systems.
- (d) Power plants.
- (e) Tie downs or anchorages.
- (f) Signal system.
- (g) Guys.

17.3.3 Repairs or replacements shall be provided promptly as needed for safe operation. The following are examples:

- (a) All critical parts of functional operating mechanisms which are cracked, broken, corroded, bent or excessively worn.



(b) All critical parts of the crane or derrick structure which are cracked, bent, broken or excessively corroded.

\* (c) Crane or derrick hooks showing defects described in 15.3.5 shall be discarded. Repairs by welding or reshaping are not acceptable unless written approval of the department is obtained.

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(d) Pitted or burned electrical contacts should be corrected only by replacement and in sets. Controller parts should be lubricated as recommended by the manufacturer.

17.3.4 All replacement parts or repairs shall have at least the original safety factor and be in accordance with the specifications of the manufacturer. Approval of the department shall be required for the replacement or repair of main structural members as enumerated in 1 and 2 of 3.1.1 for which no fee will be required.

#### **17.4 Lubrication of Cranes and Derricks.-**

17.4.1 All moving parts of the crane or derrick and hoist for which lubrication is specified, including rope and chain, shall be regularly lubricated. Lubricating systems shall be checked for proper delivery of lubricant. Particular care should be taken to follow manufacturer's recommendations as to point and frequency of lubrication, maintenance of lubricant levels and types of lubricants to be used. Lubrication shall be performed under the supervision of the crane operator, oiler or maintenance engineer.

\* 17.4.2 Machinery shall be stationary while lubricants are being applied and protection provided as called for in 17.2.1(b) through 17.2.1(e) inclusive, unless such machinery is equipped for automatic lubrication.

*\*Local Law 50 -1973*

#### **18.0 Rope Inspection, Replacement and Maintenance by Owner for Cranes and Derricks.-**

*Section 18.1 shall be deleted in its entirety and replaced as follows:*

##### **[18.1 Inspection.-**

\* 18.1.1 All ropes in continuous service should be visually inspected once every working day. A thorough inspection of all ropes in use shall be made at least once a month. All inspections shall be performed by an appointed person. Any deterioration resulting in measurable loss of original strength, such as described below shall be carefully noted and determination made as to whether further use of the rope would constitute a safety hazard:

(a) Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion or wear of outside wires.

(b) A number of broken outside wires and the degree of distribution of concentration of such broken wires.

(c) Worn outside wires, "birdcaging," or kinks.

(d) Corroded or broken wires at end connections.

(e) Corroded, cracked, bent, worn or improperly applied end connections.

(f) Severe kinking, crushing, cutting or unstranding.

*\*Local Law 50-1973*

18.1.2 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.

18.1.3 All rope which has been idle for a period of a month or more due to shutdown or storage of the crane or derrick on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by an appointed person whose approval shall be required for further use of the rope.

18.1.4 Particular care shall be taken in the inspection of non-rotating rope.]

**18.1 Rope Inspection. -**

**18.1.1 Frequent Inspection. -**

18.1.1.1 All ropes in continuous service shall be visually inspected once every working day. A visual inspection shall consist of observation of all rope that can reasonably be expected to be in use during the day's operation. This visual inspection shall be directed towards discovering gross damage that may be an immediate hazard, including the following:

- (a) Distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion. Loss of rope diameter in a short rope length or unevenness of outer strands should provide evidence that the rope or ropes must be replaced.
- (b) General corrosion
- (c) Broken or cut strands
- (d) Number, distribution and type of visible broken wires (See Section 18.2.2 for further guidance)
- (e) Core failure in rotation-resistant ropes. When such damage is discovered, the rope shall be either removed from service or given an inspection as detailed in Section 18.1.2

18.1.1.2 Care shall be taken when inspecting sections of rapid deterioration such as flange points, crossover points, and repetitive pickup points.

18.1.1.3 Care shall be taken when inspecting the following types of rope:

- (a) Rotation-resistant rope.
- (b) Boom hoist rope.

**18.1.2 Periodic Inspection. -**

18.1.2.1 There shall be periodic inspections performed at least annually. The inspection frequency shall be determined by a qualified person and shall be based on such factors as expected rope life as determined by experience on the particular installation or similar installations, severity of the environment, percentage of capacity lifts, frequency rates of operation, and exposure to shock loads. Inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of its useful life.

18.1.2.2 In the event a periodic inspection is not feasible within a 12-month period due to existing set-up and configuration of the equipment or due to site conditions, such periodic inspection shall be performed as soon as it becomes feasible but no longer than an additional 6 months for running ropes and, for standing ropes, at the time of disassembly. Written notification and approval of the commissioner must be obtained prior to extending the use of the rope beyond the 12-month inspection period.

18.1.2.3 Periodic inspections shall be performed by a qualified person. This inspection shall cover the entire length of rope. Only the surface wires of the rope shall be inspected. Any deterioration resulting in an appreciable loss of original strength shall be noted and determination made as to whether further use of the rope would constitute a hazard. The periodic inspection shall include examination of the following:

- (a) points listed in Section 18.1.1.1
- (b) reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- (c) severely corroded or broken wires at end connections
- (d) severely corroded, cracked bent, worn or improperly applied end connections

18.1.2.4 Care shall be taken when inspecting sections of rapid deterioration, such as the following:

- (a) sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited
- (b) sections of the rope at or near terminal ends where corroded or broken wires may protrude.

18.1.2.5 All rope that has been idle for a period of six months or more shall be given a periodic inspection before it is placed into service.

*Section 18.2 shall be deleted in its entirety and replaced as follows:*

**[18.2 Rope Replacement.-**

18.2.1 Safety in regard to rope replacement shall depend upon the use of good judgment by an appointed person in evaluating strength in used rope.

18.2.2 Conditions such as the following should be sufficient reason for replacement:

- (a) In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
- (b) Wear of one-third the original diameter of outside individual wires.
- (c) Kinking, crushing, bird caging or any other damage resulting in distortion of the rope structure.
- (d) Evidence of any heat damage from any cause.
- (e) Reductions from nominal diameter of more than 3/64 inch for diameters to and including 3/4 inch, 1/16 inch for diameter 7/8 inch to 1 1/8 inches inclusive, 3/32 inch for diameters 1 1/4 inches to 1 1/2 inches inclusive.
- (f) In standing ropes, more than two broken wires in one lay in sections beyond and connections or more than one broken wire at an end connection.
- (g) In standing or running ropes noncompliance with section C26-1909.2(b), (c) or (d).

18.2.3 Discarded rope should not be used for slings.]

**18.2 Rope Replacement. -**

18.2.1 When a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgement of a qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

18.2.2 Removal criteria for rope replacement shall meet manufacturer's specification or as follows:

(a) Broken Wires

- (1) in running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
- (2) In rotation-resistant ropes, two randomly distributed broken wires in six diameters or four randomly distributed broken wires in 30 rope diameters.
- (3) One outer wire broken at the point of contact with the core rope that has worked its way out of the rope structure and protrudes or loops out from the rope structure. Additional inspection of this section is required.
- (4) Kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure.
- (5) Evidence of heat damage from any cause
- (6) Reductions from nominal diameter of more than the following:
  - (a) 1/64 in. for diameters up to and including 5/16 in.
  - (b) 1/32 in. for diameters up to and including 1/2 in.
  - (c) 3/64 in. for diameters up to and including 3/4 in.

(d) 1/16 in. for diameters up to and including 1 1/8 in.

(e) 3/32 in. for diameters up to and including 1 1/2 in.

(7) In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

18.2.3 Replacement rope shall have strength rating at least as great as the original rope furnished or recommended by the crane manufacturer. Any deviation from the original size, grade, or construction shall be specified by the rope manufacturer, the crane manufacturer, or a qualified person.

18.2.4 Discarded rope shall not be used for slings.

### **18.3 Rope Maintenance.-**

18.3.1 Rope shall be stored to prevent damage or deterioration.

18.3.2 Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer and with extreme care to avoid kinking or inducing a twist.

18.3.3 Before cutting a rope, seizings shall be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands. On preformed rope, one seizing on each side of the cut is required. On non-preformed ropes of 7/8 inch diameter or smaller, two seizings on each side of the cut are required, and for non-preformed rope of one inch diameter or larger, three seizings on each side of the cut are required.

18.3.4 During installation care shall be observed to avoid dragging of the rope in dirt or around objects which will scrape, nick, crush, or induce sharp bends in it.

18.3.5 Rope should be maintained in a well lubricated condition. It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant and to this end the rope manufacturer should be consulted. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion. Periodic field lubrication is particularly important for non-rotating rope.

***Section 19.0 shall be deleted in its entirety and replaced as follows.***

### **[\* 19.0 Safety Devices Required.-**

***\*Local Law 50-1973***

**19.1** All cranes or derricks having a maximum rated capacity exceeding one ton shall be equipped with safety devices as provided herein, except equipment used exclusively for pile driving, clamshell and dragline used for excavation. These safety devices shall be acceptable to the commissioner.

**19.1.1** All mobile cranes, including truck mounted tower cranes, shall be equipped with:

(a) A warning light and an acoustical signal located at the operator's position or cab to indicate overload and shall consist of either of the following devices:

***\*Local Law 50-1973***

(1) A load measuring device in combination with a load radius or boom angle measuring device with presettable load and angle or radius limits to activate the warning signals and to be used in conjunction with the approved load radius chart.

(2) A load and radius measuring device pre-programmed to continuously relate the measured data to the load radius chart as a direct reading of load or percentage of rated load.

(b) Where electrically powered, a deadman control on control levers in the cab or crane operator's station.

(c) An effective audible warning and operating signal on the outside of the cab.

(d) Boom stops and boom hoist safety shutoffs. However, boom stops shall not be required for telescoping booms.

(e) An indicator for leveling the crane.

19.1.2 All tower cranes and climber cranes excluding truck-mounted tower cranes, shall have the following safety devices:

- (a) Warning light shall be activated at 100% allowable overturning moment.
- (b) Acoustic signal shall sound at 105% allowable overturning moment.
- (c) Automatic stop if 110% allowable overturning moment is reached.
- (d) Automatic stop if load exceeds maximum rated load in high gear.
- (e) Automatic stop if load exceeds maximum rated load in intermediate gear.
- (f) Automatic stop if load exceeds maximum rated load in low gear.
- (g) Predeceleration before top position of the hook.
- (h) Limit switch for top position of the hook.
- (i) Predeceleration before low position of the hook.
- (j) Limit switch for the trolley traveling out.
- (k) Limit switch for the trolley traveling in.
- (l) Acceleration limitation on the hoist movement.
- (m) Acceleration limitation on the swing movement.
- (n) Acceleration limitation on the trolley movement.
- (o) Deadman control on both joy sticks in box.

\*19.1.3 Safety devices for derricks shall be acceptable to the commissioner and shall be installed within six months after said devices are accepted. However, where electrically powered, a deadman control on control levers shall be installed prior to applying for a certificate pursuant to section C26-1909.4.

*\*Local Law 50-1973*

\*19.1.4 Any safety device previously approved by the board of standards and appeals shall be acceptable as meeting the requirements of the applicable subparagraphs of 19.1.1.

*\*Local Law 50-1973]*

**19.0 Safety Devices Required.** - All cranes and derricks shall be equipped with safety devices as provided herein, except equipment used exclusively for pile driving, clamshell and dragline used for excavation. The commissioner shall approve these safety devices.

**19.1 Indicators or Limiters.** - All mobile cranes with a maximum rated capacity of 3 tons or more shall be equipped with a load indicator, rated capacity indicator, or a rated capacity (load) limiter.

19.1.1 Cranes with a total boom length including jibs and any other extensions not exceeding 150 feet shall be exempt.

19.1.2 Cranes manufactured before December 30, 1993 shall be exempt. The margin of stability for determination of load ratings of these cranes shall be established at 75 percent of the load, which will produce a condition of tipping or balance with the boom in the least stable direction relative to the mounting where overturning stability governs the lifting performance.

19.1.3 Cranes shall have a radius or boom angle indicator provided in conjunction with a load indicator.

**19.2 Anti-Two Blocking Features.** - All mobile cranes with a maximum rated capacity exceeding one ton manufactured after February 28, 1992, shall be equipped with anti-two-blocking features as follows:

- (a) Telescopic Boom Cranes shall have an anti-two-block device for all points of two-blocking that automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom and/or jib tip.

- (b) Lattice Boom Cranes shall have an anti-two-block device for all points of two-blocking that either automatically prevents damage from contact between the load block, overhaul ball, or similar component, and the boom and/or jib tip or warns the operator in time for the operator to prevent two-blocking.

**19.3 Additional Safety Devices Required.** - All mobile cranes with a maximum rated capacity exceeding one ton shall be equipped with the following additional safety devices:

- (a) A deadman control on the control levers in the cab or crane operator's station, where the crane is electrically powered.
- (b) An effective audible warning and operating signal on the outside of the cab.
- (c) Boom stops and boom hoist safety shutoffs. However, boom stops shall not be required for telescoping booms.
- (d) An indicator for leveling the crane.
- (e) Hoist drum rotation indicator if the drum is not visible from the operator's station.

**19.4 Malfunctioning Safety Devices.** - The load indicator, rated capacity indicator, rated capacity (load) limiter, hoist drum rotation indicator, and the anti-two blocking devices shall also be known as operational aids, which provide information to facilitate the operation of a crane or that take control of particular functions without action of the operator when a limiting condition is sensed. When any of these operational aids are inoperative or malfunctioning, the following alternative measures shall be implemented to allow continued use of the crane:

- (a) Load indicator, Rated capacity indicator or Rated Capacity (Load) Limiter: The weight of the load shall be determined from a reliable source (such as the manufacturer's equipment specification), by a reliable calculation method (such as calculating a steel beam from measured dimensions and a known per foot weight) or by other equally reliable means before the load is hoisted. To ensure that the weight of the load does not exceed the crane ratings at the maximum radius at which the load is to be handled, the radius shall be determined through the use of a boom angle indicator, radius indicator or by measurement.
- (b) Hoist drum rotation indicator: Mirrors and/or remote video cameras and displays shall be provided so that the operator can see the drum.
- (c) Anti-two-block device: The cable shall be clearly marked (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to prevent two-blocking or an additional signal person shall be utilized to monitor the position of the load block or overhaul ball.

Recalibration or repair of the safety device shall be accomplished as soon as is reasonably possible, as determined by a qualified person.

**19.5 Tower Cranes and Climber Cranes.** - All tower cranes and climber cranes excluding truck-mounted tower cranes shall have the following:

- (a) Warning light activated at 100% allowable overturning moment,
- (b) Acoustic signal sounding at 105% allowable overturning moment,
- (c) Automatic stop if 110% allowable overturning moment is reached,
- (d) Automatic stop if load exceeds maximum rated load in high gear,
- (e) Automatic stop if load exceeds maximum rated load in intermediate gear,
- (f) Automatic stop if load exceeds maximum rated load in low gear,
- (g) Predeceleration before top position of the hook,

- (h) Limit switch for top position of the hook,
- (i) Predeceleration before low position of the hook,
- (j) Limit switch for the trolley traveling out,
- (k) Limit switch for the trolley traveling in,
- (l) Acceleration limit on the hoisting movement,
- (m) Acceleration limit on the swing movement,
- (n) Acceleration limit on the trolley movement, and
- (o) Deadman control on both control levers in box.

**19.6 Derricks.-**Safety devices for derricks shall be approved by the commissioner and shall be installed within six months after said devices are accepted. However, where electrically powered, a deadman control on control levers shall be installed prior to applying for a certificate pursuant to section 27-1057 of the Administrative Code.

*Section 20 shall be deleted in its entirety as follows:*

**[20.0 Characteristic and Special Requirements for Mobile Cranes.-**

**20.1 Hoists, load and swing mechanisms.-**

20.1.1 Boom hoist.

- (a) The boom hoist shall be capable of lifting the boom when the outer end is at the level of the surface on which the crane rest.
- (b) The hoisting mechanism shall be provided with a suitable clutching or power engaging device permitting immediate starting or stopping of the boom drum motion. The hoisting mechanism also shall be provided with a self-setting safety brake, capable of supporting all rated loads, with recommended reeving.
- (c) Brakes and clutches shall be arranged to be readily adjusted to compensate for wear and to maintain adequate tension in springs where used.
- (d) The hoisting mechanism shall be provided with an auxiliary ratchet and pawl or other positive locking device for use as an added safety feature.
- \* (e) The hoist drum shall have sufficient rope capacity to operate the boom at all positions between the horizontal and the highest angle recommended by the manufacturer and submitted to the department of buildings for the appropriate reeving and rope size, and

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- (1) At least two full wraps of rope shall remain on the drum when the boom point is lowered to the level of the crane supporting surface.
- (2) The drum end of the rope shall be anchored by a clamp securely attached to the drum or a wedge socket arrangement approved by the crane or rope manufacturer and submitted to the department of buildings.
- (f) The drum diameter shall be sufficient to provide a first layer rope pitch diameter of not less than 15 times the nominal diameter of the rope used.

20.1.2 Load hoist.-

- (a) The load hoist assemblies shall have power and operational characteristics adequate to perform all load hoisting and lowering functions required in crane service when operated under conditions recommended by the manufacturer and submitted to the department of buildings.
- (b) Where brakes and clutches are used to control the motion of the load hoist drums, they shall be of sufficient size and thermal capacity to control all rated crane loads with minimum accepted reeving.
- \* (c) Load hoist drums shall have sufficient rope capacity size and reeving to perform crane service within the range of boom lengths, operating radii and vertical lifts stipulated by the manufacturer and

submitted to the department of buildings.

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\* (d) No less than two full wraps of rope shall remain on the drum when the hook is in its extreme low position.

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\* (e) The drum end of the rope shall be anchored by a clamp securely attached to the drum or by a wedge socket arrangement approved by the crane or rope manufacturer and submitted to the department of buildings.

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(f) Drums shall be provided with a means to prevent rope from jumping off the drum.

(g) The diameter of the load hoist drum shall be sufficient to provide a first layer rope pitch diameter of not less than 18 times the nominal diameter of the rope used.

(h) Positive means, controllable from the operator's station, shall be provided to hold the drum from rotating in the lowering direction and be capable of holding the rated load indefinitely without further attention from the operator.

\* (i) Drum rotation indicators shall be provided and located to afford easy sensing by the operator except when a crane is used exclusively with a clamshell or dragline for excavation purposes or for pile driving.

20.1.3 Load hoist brakes.-

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(a) When power-operated brakes having no continuous mechanical linkage between the actuating and braking means are used for controlling loads, an automatic means shall be provided to prevent the load from falling in event of loss of brake actuating power.

\* (b) Foot-operated brake pedals shall be constructed so that the operator's feet will not easily slip off. Means for latching brake in the applied position shall be provided.

(c) Brakes and clutches shall be provided with adjustments where necessary to compensate for wear and to maintain adequate tension in springs where used.

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\* 20.1.4 Optional power-controlled lowering.-A power-controlled lowering device may be provided to obtain precision lowering and to reduce demand on the load brake. Such device shall be capable of handling rated loads and speeds as specified by the manufacturer and submitted to the department of buildings.

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20.1.5 Swing control.-

(a) The swing mechanism shall be capable of smooth starts and stops with the varying degrees of acceleration and deceleration required in normal crane operation.

(b) A brake having adequate holding power in both directions shall be provided to prevent movement of the rotating superstructure, when desired under normal operation. The brake shall be capable of being set in the holding position and remaining so without attention on the part of the operator.

(c) A device for positively locking the rotating superstructure shall be provided. It shall be so constructed as to prevent accidental engagement or disengagement.

## **20.2 Travel controls.-**

20.2.1 General.-

(a) On all mobile crane types except truck cranes the controls for the travel function shall be located at the operator's station in the crane cab.

(b) On truck cranes the main travel controls shall be located in the truck cab. Auxiliary travel controls may be provided in the crane cab.

20.2.2 Travel mechanism.-



(a) On crawler cranes, the travel and steering mechanism shall be arranged so that it is not possible for both crawlers to become disconnected simultaneously from the power train and to free wheel.

(b) On truck cranes, the carrier transmission shall have a gear-ratio pattern and adequate control to minimize stalling.

#### 20.2.3 Travel brakes and locks.-

(a) On crawler cranes, brakes or other locking means shall be provided to hold the machinery stationary during working cycles on level grade or while the machine is standing on maximum grade recommended for travel. Such brakes or locks shall be arranged to remain in engagement in event of loss of operating power.

(b) On truck and wheel-mounted cranes, means shall be provided to control completely the crane carrier travel when descending maximum grades specified by the manufacturer under maximum loading conditions. Brakes shall be provided to bring the machine to a stop on level ground within a distance of 32 feet from a speed of 15 miles per hour. Where long or steep grades are to be negotiated, a retarder or similar device should be provided. Means shall be provided to hold the machine stationary on the maximum grade for travel recommended by the manufacturer.

### **20.3 Operating controls.-**

#### 20.3.1 General.-

(a) All controls used during the normal crane operating cycle shall be located within easy reach of the operator while seated at his station.

(b) Arrangement of controls shall be in accordance with applicable requirements of SAE recommended practice crane-shovel basic operating control arrangements, J983 as approved April 1967. Controls for load hoist, boom hoist, and swing clutches shall be provided with means for holding in neutral position, without the use of positive latches.

(c) Shielded panel lights shall be installed over controls.

#### 20.3.2 Control forces and movements.-

(a) When the crane is operated within the ratings and reeving accepted by the department of buildings, controls shall meet the following requirements:

1-Forces required to operate shall not be greater than 35 pounds on hand levers nor greater than 50 pounds on foot pedals.

2-Travel distance on hand levers shall not be greater than 14 inches from the neutral position on two-way levers and not greater than 24 inches on one way levers. Travel distance on foot pedals shall not be greater than 10 inches.

20.3.3 Power plant controls.-Controls for operating the superstructure power plant shall be within easy reach of the operator and shall include:

(a) Means to start and stop.

(b) Means to control speed of internal combustion engines.

(c) Means for shifting selective transmission.

\*20.3.4 Engine clutch.-All cranes with a direct mechanical drive to any crane function shall be provided with a clutch for disengaging power. The clutch control shall be within reach from the operator's position.

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### **20.4 Ropes and reeving accessories.-**

#### 20.4.1 Ropes.-

(a) The hoisting rope shall be of a construction submitted to the department of buildings for crane service. Non-rotating rope shall not be used for boom hoist reeving nor for multiple part reeving.

(b) Socketing shall be done in a manner specified by the manufacturer of the assembly and submitted to the department of buildings.

(c) If a load is supported by more than one part of rope, the tension in the ropes shall be equalized.

(d) Whenever exposed to temperatures at which fiber cores would be damaged, ropes having an independent wire-rope or wire-strand core, or other temperature-damage-resistant core shall be used.

\* (e) Replacement rope shall be the same size, grade and construction as the original rope furnished by the crane manufacturer and submitted to the department of buildings. Alternate replacement ropes may be used only if specifically recommended by a wire rope manufacturer or the crane manufacturer and submitted to the department of buildings.

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#### 20.4.2 Rope safety factors.-

(a) For supporting rated loads (including boom suspensions):

1-The safety factor for live or running ropes that wind on drums or pass over sheaves shall be not less than 3.5.

2-The safety factor for boom pendants or standing ropes shall not be less than 3.0.

\* (b) For supporting the boom and working attachments at recommended travel or transit positions and boom lengths, the safety factor shall be:

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1-For live or running ropes, not less than 3.5.

2-For boom pendants or standing ropes, not less than 3.0.

\* (c) For supporting the boom under boom erection conditions, the safety factor shall be:

**\*Local Law 50-1973**

1-For live or running ropes, not less than 3.0.

2-For boom pendants or standing ropes, not less than 2.5.

#### 20.4.3 Reeving accessories.-

\* (a) Eye splices shall be made in an approved manner and rope thimbles shall be used in the eye.

\* (b) U-bolt clips shall have the U-bolt section on the dead or short-end, and the saddle on the live or long end of the rope. Spacing and number of all types of clips shall be in accordance with the clip manufacturer's recommendation and submitted to the department of buildings. Clips shall be drop-forged in all sizes manufactured commercially. When a newly installed rope has been in operation for one hour, all nuts on the clip bolts shall be retightened, and they shall be checked for tightness at frequent intervals thereafter.

**\*Local Law 50-1973**

\* (c) Swaged, compressed or wedge-socket fittings shall be applied as recommended by the rope or crane manufacturer or fitting manufacturer and submitted to the department of buildings.

#### 20.4.4 Sheaves.-

**\*Local Law 50-1973**

(a) Sheave grooves shall be smooth and free from surface defects which could cause rope damage. The cross sectional radius at the bottom of the groove shall be such as to form a close-fitting saddle for the size of rope used and the sides of the groove shall be tapered outwardly to facilitate entrance of the rope into the groove. Flange corners shall be rounded and the rims shall run true about the axis of rotation.

(b) Sheaves carrying ropes which may be momentarily unloaded shall be provided with close-fitting guards or other suitable devices to guide the rope back into the groove when the load is reapplied.

(c) The sheaves in the lower load block shall be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with ropes loose.

(d) Means shall be provided to prevent chafing of the ropes.

(e) All sheave bearings shall be provided with means for lubrication unless permanently lubricated bearings are provided.

#### 20.4.5 Sheave sizes.-

(a) Boom hoisting sheaves shall have pitch diameters of not less than 15 times the nominal diameter

of the rope used.

(b) Load hoisting sheaves shall have pitch diameters not less than 18 times the nominal diameter of the rope used.

(c) Load block sheaves shall have pitch diameters not less than 16 times the nominal diameter of the rope used.

## **20.5 Crane cabs.-**

### **20.5.1 Crane cab construction.-**

(a) Insofar as practical, all cabs shall be constructed to enclose the superstructure machinery, brakes and the operator's station to provide protection from the weather.

\* (b) All windows shall be of, safety glass or equivalent. Windows shall be provided in the front and on both sides of the cab or operators compartment for visibility forward and to either side. Visibility forward shall include a vertical range adequate to cover the boom point at all times. The front window may have a section which can be readily removed or held open if desired. If the section is of the type held in the open position, it shall be well secured to prevent accidental closing.

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(c) All cab doors whether of sliding or swinging type shall be adequately restrained from accidental opening or closing while traveling or operating the machine. The door adjacent to the operator, if of the swinging type, shall open outward and, if of the sliding type, shall slide rearward to open.

(d) A clear passageway shall be provided from the operator's station to an exit door on the operator's side.

(e) Principal walking surfaces in cabs shall be of anti-skid type.

(f) Outside platforms, if furnished, shall be provided with guard rails. Where platforms are too narrow to use guard rails, handholds shall be provided at convenient points above the platform.

20.5.2 Access to cab.- On all crawler, truck and wheel mounted cranes, suitable handholds and steps shall be provided to facilitate entrance to and exit from the operator's cab and the truck cab.

20.5.3 Access to cab roof.- Where access to the cab roof is necessary for rigging or service requirements, a ladder or steps shall be provided to give access thereto and the cab roof shall be capable of supporting, without permanent distortion, the weight of a 200 pound man.]

## **21.0 Characteristics and Special Requirements for Derricks.-**

### **21.1 Load ratings.-**

\* 21.1.1 Rated load marking.-

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(a) For derricks, a substantial, durable and clearly legible load rating chart shall be provided for each particular installation. The rating chart shall be securely affixed where it is visible to personnel responsible for the operation of, the equipment. The chart shall include but not be limited to the following data:

1-manufacturer's load ratings as approved by the department at corresponding ranges of boom angle or operating radii.

2-specific lengths of components on which the load ratings are based.

3-required parts for hoist reeving.

4-size and construction of all ropes shall be shown either on the rating chart or in the operating manual.

(b) For all other derricks, the manufacturer shall provide sufficient information from which capacity charts can be prepared and approved by the department for the particular installation. The capacity charts shall be located either at the derrick or the job site office.

### **21.2 Construction.-**

21.2.1 General.-Derricks shall be constructed to adequately meet all stresses imposed on all members and

components.

#### 21.2.2 Guy derricks.-

- (a) The minimum number of guys is six. Preferably, the guys should be equally spaced around the mast.
- (b) The manufacturer shall furnish complete information recommending:
  - 1- the number of guys.
  - 2- the spacing around the mast;
  - 3- the maximum vertical slope and initial tension or sag of all guys;
  - 4- the size and construction of rope to be used in each.
- (c) The mast base shall permit free rotation of the mast with allowance for slight tilting of the mast caused by guy slack.
- (d) The mast cap shall:
  - 1 - permit free rotation of the mast;
  - 2 - adequately withstand tilting and cramping action imposed by the guy loads;
  - 3 - be secured to the mast to prevent disengagement during erection;
  - 4 - be provided with means for attachment of guy ropes.

#### 21.2.3 Stiff leg derrick. -

- (a) The mast shall be supported in the vertical position by two stiff legs one end of each being connected to the top of the mast and the other end securely anchored. The stiff legs shall be capable of withstanding the loads imposed by the boom at any point within its range of swing.
- (b) The mast base shall:
  - 1 - permit free rotation of mast;
  - 2 - permit slight inclination of the mast without binding;
  - 3 - provide means to prevent the mast from lifting out of its socket when the mast is in tension.
- (c) The stiff leg connecting member at the top of the mast shall:
  - 1 - permit free rotation of the mast;
  - 2 - adequately withstand the loads imposed by the action of the stiff legs;
  - 3 - be so secured as to oppose lift off forces at all times.

### **21.3 Ropes and reeving accessories.-**

#### 21.3.1 Guy ropes.-

- (a) Guy ropes shall be of suitable size, grade and construction to withstand the maximum load imposed.
- (b) The nominal breaking strength of each rope shall be no less than three times the load applied to the rope.
- (c) Tie downs or kicker devices which may be easily loosened shall have locknuts or other suitable provision to prevent loosening.

#### 21.3.2 Boom hoist ropes.-

- (a) Boom hoist ropes shall be of suitable size, grade and construction to withstand the maximum load imposed.
- (b) The live rope reeving system in a boom suspension shall withstand the maximum load imposed and be of sufficient length to permit lowering the boom point to horizontal position with at least three full wraps of rope remaining on the hoist drum.
- (c) The nominal breaking strength of the most heavily loaded rope in a system shall be no less than three and a half times the loads applied to that rope.

#### 21.3.3 Main hoist ropes.-

- (a) Main hoist ropes shall be of a suitable size and construction to withstand the maximum load imposed.

(b) Ropes in the main hoisting system shall be of sufficient length for the entire range of movement specified for the application with at least three full wraps of rope on the hoist drum at all times.

(c) The nominal breaking strength of the most heavily loaded rope in a system shall be no less than three and a half times the load applied to that rope.

#### 21.3.4 Reeving accessories.-

(a) Socketing shall be done in the manner specified by the manufacturer of the assembly.

(b) Rope end shall be anchored securely to the drum.

(c) Eyes shall be made in an approved manner and rope thimbles should be used in the eye.

(d) U-bolt clips shall have the U-bolt on the dead or short end, and the saddle on the live or long end of the rope. Spacing and number of all types of clips shall be in accordance with the clip manufacturer's recommendation and submitted to the department. Clips shall be drop-forged steel in all sizes manufactured commercially. When a newly installed rope has been in operation for an hour, all nuts on the clip bolts shall be retightened, and they should be checked for tightness at frequent intervals thereafter.

(e) Swaged, compressed, or wedge-socket fittings shall be applied as recommended by the rope, derrick, or fitting manufacturer.

(f) Where a half wedge socket is used it shall be of a positive locking type.

(g) If a load is supported by more than one rope, the tension in the parts shall be equalized.

#### 21.3.5 Sheaves.-

(a) Sheave grooves shall be smooth and free from surface defects which could cause rope damage. The cross sectional radius at the bottom of the groove should be such as to form a close fitting saddle for the size rope used and the sides of the groove should be tapered outwardly to facilitate entrance of the rope into the groove. Flange corners should be rounded and the rims should run true about the axis of rotation.

(b) Sheaves carrying ropes which can be momentarily unloaded shall be provided with close fitting guards or other suitable devices to guide the rope back into the groove when the load is applied again.

(c) The sheaves in the lower load block shall be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with ropes loose.

(d) Means should be provided, if necessary, to prevent chafing of the ropes.

(e) All running sheaves shall be equipped with means for lubrication. Permanently lubricated, sealed and/or shielded bearings shall be acceptable.

(f) Boom and hoisting sheaves shall have pitch diameters not less than eighteen times the nominal diameter of the rope used.

(g) Boom point sheaves should be provided with suitable guides to limit the offlead angle of the rope when entering the grooves from either side.

### **21.4 Anchoring and guying.-**

#### 21.4.1 Guy derricks.-

(a) The mast base shall be securely anchored. Maximum horizontal and downward vertical thrusts encountered when handling rated loads with the particular guy slope and spacing stipulated for the application are among the design factors for which provision must be made.

(b) The guys shall be secured to the ground or other firm anchorage. Maximum horizontal and vertical pulls encountered while handling rated loads with the particular guy slope and spacing stipulated for the application are among the factors for which provision must be made.

#### 21.4.2 Stiff leg derricks.-

(a) The mast base shall be securely anchored. Maximum horizontal and upward and downward vertical thrusts encountered while handling rated loads stipulated for the application with the particular stiff-leg spacing and slope are among the factors for which provision must be made.

(b) The stiff legs shall be securely anchored. Maximum horizontal and vertical upward and downward thrusts encountered while handling rated loads with the particular stiff-leg arrangement stipulated for the application are among the factors for which provision must be made.

### **21.5 Hoist.-**

21.5.1 The hoist shall be suitable for the derrick work intended and shall be securely anchored to prevent displacement from the imposed loads.

\* 21.6 Cranes manufactured prior to April 1, 1970 shall be modified to conform to the provisions of 20.1.1(d) and (f), 20.1.2(h) and (i), 20.2.3, 20.3.1(b) and (c), 20.3.2(a)(2), 20.4.5, 20.5.1(b) and derricks manufactured prior to April 1, 1970 shall be modified to conform to the provisions of 21.3.5(f), unless it can be shown to the satisfaction of the commissioner that the crane can not feasibly or economically be altered to comply.

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## **22.0 Operation Cranes and Derricks. -**

### **22.1 Operators.-**

22.1.1 Cranes and derricks shall be operated only by the following persons:

- (a) Persons licensed as operators by the department of buildings in accordance with section B26-5.0.
- (b) Learners in the presence of and under the direct supervision of a licensed operator.

22.1.2 No person other than those listed under paragraph 22.1.1 above and persons such as oilers and supervisors, whose duties require them to do so, shall enter the cab of a crane and then only in the performance of his duties and with knowledge and consent of the operator.

### **22.2 Operating practices.-**

22.2.1 The operator shall not engage in any practice which will divert his attention while actually engaged in operating the crane or derrick hoist.

22.2.2 The operator shall respond to signals only from the appointed signal men.

22.2.3 The operator shall be responsible for the operation of the crane or derrick hoist.

\* 22.2.4 For mobile cranes, the warning signal shall be sounded each time before on-site traveling and intermittently during such travel, particularly when approaching workmen.

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22.2.5 Before leaving his crane or derrick unattended, the operator shall:

- (a) Land any attached load, bucket, lifting magnet, or other device.
- (b) Disengage clutches.
- (c) Set travel, swing, boom brakes and other locking devices.
- (d) Put controls in the "off" position.
- (e) Stop the engine.
- (f) Secure mobile cranes against accidental travel.

(g) Lock and secure the equipment against unauthorized operation.

22.2.6 On leaving a mobile crane overnight, ground chocks shall be set and crane booms shall be lowered to ground level or otherwise fastened securely against displacement by wind loads or other external forces.

22.2.7 If there is a warning sign on the switch or engine starting controls, the operator shall not close the switch or start engine until the warning sign has been removed by the person placing it there.

22.2.8 Before closing the switch, or starting the engine, the operator shall see to it that all controls are in the "off " position and all personnel are in the clear.

22.2.9 If power fails during operation, the operator shall:

- (a) Set all brakes and locking devices.
- (b) Move all clutch or other power controls to the "off " position.

(c) Communicate with the appointed individual in charge of operations.

(d) If practical, the suspended load should be landed under brake control.

22.2.10 The operator shall familiarize himself with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known he shall report the same promptly to his employer or other person responsible for the equipment and shall also notify the next operator of the defects upon changing shifts.

22.2.11 All controls shall be tested by the operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

22.2.12 Booms of mobile cranes which are being assembled or disassembled on the ground with or without support of the boom harness (equalizing sheaves, bridal and boom pendants) should be securely supported by proper blocking to prevent dropping of the boom sections.

### **23.0 Handling the Load.-No crane or derrick shall be loaded beyond the rated load.**

**23.1 Size of load.-** On all operations involving cranes or derricks which are not equipped with those safety devices which make use of load measuring systems, there shall be a competent appointed individual assigned on a full-time basis to be responsible for determining the magnitude of loads to be lifted or lowered. The operator shall not make a lift unless he has first determined the weight of the load or is informed of such weight by the appointed person responsible for the operation.

#### **23.2 Attaching the load.-**

23.2.1 The hoist rope shall not be wrapped around the load.

23.2.2 The load shall be attached to the hook by means of slings or other approved devices.

#### **23.3 Moving the load.-**

23.3.1 The appointed individual directing the lift shall see that:

(a) In the case of a mobile crane, the crane is level and where necessary, chocked 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.

23.3.2 Before starting to hoist, he shall take care that:

(a) Hoist ropes are not kinked.

(b) Multiple part lines are not twisted around each other.

(c) The hook is brought over the load in such a manner as to prevent swinging.

(d) If there is a slack rope condition, the rope is properly seated on the drum and in the sheaves.

23.3.3 During hoisting, care should be taken that:

(a) There is no sudden acceleration or deceleration of the moving load.

(b) The load does not contact any obstructions.

23.3.4 Side loading of booms shall be limited to freely suspended loads. Cranes shall not be used for dragging loads sideways. Derricks shall not be used for side loading.

#### ***Section 23.3.5 shall be revised as follows:***

23.3.5 The operator shall not lift, lower, swing or travel while any person is on the load or hook<sub>[,]</sub> unless notification is filed with the Department pursuant to Section 23.6 of this title. The operator shall not carry loads over people or over any occupied building <sub>[,]</sub> unless the top two floors are vacated or overhead protection with a design live load of 300 psf is provided.

23.3.6 On truck cranes, loads shall be lifted over the front area only as recommended by the manufacturer and submitted to the department of buildings.

23.3.7 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.

23.3.8 For mobile cranes, 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 and approved by the department of buildings.

23.3.9 Neither the load nor the boom shall be lowered below the point where less than three full wraps of rope remain on their respective drums.

23.3.10 When two or more cranes are used to lift one load, one appointed person shall be responsible for the operation. He shall analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

23.3.11 In transit, the following additional precautions for mobile cranes shall be exercised:

(a) The boom shall be carried in line with the direction of motion.

(b) The superstructure shall be secured against rotation. When negotiating turns or when the boom is supported on a dolly, the superstructure may be rotated by a licensed crane operator only.

(c) The empty hook shall be lashed or otherwise restrained so that it cannot swing freely.

23.3.12 Before traveling a crane with a load, proposed travel should be shown on a plan of operation and approved by the department. Such data shall be filed with an application for on-site inspection.

23.3.13 A crane shall not be traveled with the boom so high that it may bounce back over the cab.

23.3.14 When rotating the crane or derrick, sudden stops shall not be made. 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.

23.3.15 When a crane is to be operated at a fixed radius, the boom hoist pawl or other positive locking device shall be engaged.

23.3.16 Use of winch heads:

(a) Ropes shall not be handled on a winch head without knowledge of the operator.

(b) While a winch is being used, the operator shall be within convenient reach of the power unit control lever.

#### **23.4 Holding the load.-**

23.4.1 The operator shall not leave his position at the controls while the load is suspended.

23.4.2 People shall not be permitted to stand or pass under a load.

23.4.3 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 at the operator's station.

23.4.4 In all cases, when booms are raised or lowered from the horizontal, load blocks including hooks and weight balls shall be left on the ground or deposited to the ground before raising or lowering booms.

#### **23.5 Securing derrick booms.-**

23.5.1 Dogs, pawls, or other positive braking mechanism on the hoist shall be engaged. When not in use, the derrick boom shall:

(a) Be laid down;

(b) Be secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block; or

(c) Hoisted to a vertical position and secured to the mast.

#### ***Section 23.6 shall be added as follows:***

**23.6 Hoisting Personnel.** - Written notification shall be submitted to the commissioner at least three (3) business days prior to the date the hoisting equipment may be used to move personnel. In addition to the requirements of this section, the applicant shall also comply with all applicable OSHA requirements.



23.6.1 The applicant shall be an engineer or a licensed master rigger. However, where the boom length, including jibs and any other extensions, is greater than 250 ft, the applicant shall be an engineer.

23.6.2 The notification shall include the following:

- (a) A description of work,
- (b) The start date and duration of the work,
- (c) Manufacturer's information on the personnel platform used to perform the work,
- (d) The number of people who will be on the platform,
- (e) The actual pick load and the maximum radius of the pick,
- (f) The allowable pick load for maximum radius from load chart approved by the commissioner,
- (g) Description of how the person/people on the platform and the hoisting machine operator will communicate,
- (h) Designation of Site Safety coordinator,
- (i) Equipment user's company name, and address, and
- (j) The name and title of principal from the equipment user company.

23.6.2.1 Where the applicant is an engineer, the request shall also include a copy of the Certificate of On-Site Inspection.

23.6.2.2 Where the applicant is a master rigger, the request shall also include:

- (a) The make, model number and Certificate of Operation of the Hoisting Machine
- (b) A sketch or description of the foundation for the hoisting machine

23.6.3 Exception: If the boom length, including jibs and any other extensions, is less than 100 ft and the lift is supervised by a master rigger, written notification is not required.

## **24.0 Signals.-**

24.1 A signalman shall be provided when the point of operation is not in full and direct view of the operator unless an approved mechanical signaling or control device is provided for safe direction of the operator.

24.2 Only persons who are dependable and fully qualified by experience with the operation shall be used as signalmen.

24.3 A signalman or other appropriate controls shall be provided when operations or equipment on or adjacent to a highway create a traffic hazard.

24.4 Signalmen shall wear high visibility gloves.

24.5 A uniform hand signal system shall be used on all operations of a similar nature. The system in use by the U.S. Corps of Engineers \*(EM 385-11) may be used as the model.

*\*As enacted but (EM 385-1-1) probably intended.*

24.6 Manual hand signals may be used when the distance between the operator and the signalman is not more than 60 feet, but manual hand signals shall not be used when atmospheric conditions prevent clear visibility to the operator.

24.7 Mechanical signal systems shall be protected against unauthorized use, breakage, weather or obstruction which will interfere with safe operation. In the event of any malfunction, all motion shall be stopped immediately.

## **25.0 Miscellaneous.-**

**25.1 Ballast or counterweight.** - Cranes shall not be operated without the full amount of any ballast or counterweight in place as specified by the maker, and approved by the department.

**25.2 Wind speed limitations.** - No crane or derrick operator shall start an operation when the wind speed exceeds 30 m.p.h., or when the wind is predicted to reach 30 m.p.h. before the operation can

be completed. The U.S. weather bureau data from the nearest reporting station may be used for the determination of wind speed.

### **25.3 Operating near electric power lines. -**

25.3.1 No crane or derrick shall be operated in such a location that any part of the machine or of its load shall at any time come within 15 feet of an energized power line.

25.3.2 Before the commencement of operations near electrical lines, the appointed person responsible for the operation shall notify the owners of the lines or their authorized representatives providing them with all pertinent information and requesting their cooperation.

25.3.3 Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities certify that it is not an energized line.

### **25.4 Electrical equipment.-**

#### 25.4.1 General.-

(a) Wiring and equipment shall comply with the electrical code of the City of New York.

(b) The voltage used on control circuits shall not exceed 750 volts.

#### 25.4.2 Equipment.-

(a) Electric equipment shall be so located or enclosed that live parts will not be exposed to accidental contact.

(b) All motor, controller and switch frames shall be grounded.

(c) Electric equipment shall be thoroughly protected from dirt, grease and oil, and where exposed to the weather, shall be thoroughly protected therefrom.

(d) Guards for live parts shall be substantial and so located that they cannot be deformed so as to make contact with the live parts.

(e) Name plates shall not be removed.

#### 25.4.3 Controllers.-

(a) Each cage operated crane and derrick shall be provided with a device which will disconnect all motors from the line on failure of power and will not permit any motor to be restarted until the controller handle is brought to the "off" position, or a reset switch or button is operated.

(b) Lever operated controllers shall be provided with a notch or latch which in the "off" position prevents the handle from being inadvertently moved to the "on" position.

(c) The controller operating handle shall be located within convenient reach of the operator.

(d) As far as practicable, the movement of each controller handle shall be in the same general directions as the resultant movements of the load.

(e) For floor operated cranes and derricks, the controller or controllers, if rope operated, shall automatically return to the "off" position when released by the operator.

25.4.4 Grounding.-Each crane, which may be operated in the vicinity of a live power line, shall be effectively grounded as hereinafter provided. The crane shall be provided with a permanent clamp or other means for convenient and effective attachment of a grounding conductor. The cable connecting the clamp to the ground shall be equivalent to a No. 2 AWG or larger single conductor, superflexible, rope stranded copper, composed of not less than 1,600 individual wires, with 600 volt covering for mechanical protection and with terminal parts that insure a good connection with hand type screw clamps. An effective ground shall be one having a resistance of 25 ohms or less, which shall be measured, or a connection to a continuous underground metallic water piping system.

### **25.5 Demolition.-**

25.5.1 Crane or derrick operation when used for mechanical demolition shall comply with section C26-1905.4(d) of the building code and, in addition, a crane or derrick operating with a demolition ball shall meet the following requirements:

(a) The weight of the demolition ball shall not exceed fifty percent of the rated capacity of the boom length at its maximum radius.

- (b) The swing of the boom shall not exceed thirty degrees from the centerline, front to back of the crane mounting.
- (c) The load line and attachment of the demolition ball to the load line shall be checked at least twice daily.
- (d) Truck cranes without outriggers extended shall not be used to swing a demolition ball.

**26.0 Storage.-**

- 26.1 Necessary clothing and personal belongings shall be stored in or about the crane or derrick in such a manner as to not interfere with access or operation.
- 26.2 Tools, oil cans, waste, extra fuses, and other necessary articles shall be stored in a tool box and shall not be permitted to lie loose in or about the cab or cage.

**27.0 Refueling.-**

- 27.1 Refueling shall comply with section C26-1909.1(c).
- 27.2 Machines shall not be refueled with the engine running.

**28.0 Fire Extinguishers.-**

- 28.1 A carbon dioxide, dry chemical or equivalent fire extinguisher shall be kept in the cab or in the vicinity of the crane or derrick.
- 28.2 Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided.

**29.0 Filing for Prototype Equipment.-**Where the equipment is a duplicate of equipment previously filed with design information and approved by the department, the previous approval shall be accepted for the design. Evidence shall be submitted that the welding and other manufacturing processes affecting the structural integrity of the crane were performed in accordance with applicable specifications and that required controls were maintained and tests performed.

**30.0 Waiver of Modification of Rules and Regulations.-**The commissioner may, at his discretion, modify or waive any of the foregoing requirements where practical difficulties in complying with particular sections exist and the public safety is not endangered thereby.

\*\*\**Local Law 73-1969*

**HISTORY:**

\*\**Amended by the Department of Buildings, Effective Date: October 1, 2006;*  
*Local Law 50-1973; Local Law 73-1969.*

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**STATEMENT OF BASIS AND PURPOSE**

The proposed amendment to the Reference Standard furthers the safety of persons and property affected by the operation of power operated cranes and derricks. Specifically, the proposed amendment will refine the Certificate of Approval (Prototype) process by simplifying the submissions required and updating the reference standard to reflect Buildings' acceptance of the most current national and international standards for the design and construction of cranes and derricks. The proposed amendment will similarly update the requirements for rope inspection and

replacement, safety devices, and minimum standards for operation where a safety device may not be functioning, to meet current national standards. Additionally, the proposed amendment will establish guidelines for the use of personnel hoisting equipment and the notification to Buildings of its use.