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<i>Page</i>	<i>Location</i>	<i>Change</i>
		(13) Section 4-1.13 (formerly 4-1.12) revised in its entirety, and former Figure 4-1.12-1 deleted
		(14) In Section 4-1.15 (formerly 4-1.14), subparas. 4-1.15.1(a), 4-1.15.1(b), 4-1.15.2(a), and 4-1.15.2(b) revised; and subpara. 4-1.15.2(c) added
		(15) Former Section 4-1.15 deleted
		(16) In Section 4-1.16, subparas. (d) and (h) revised
		(17) In Section 4-1.17, subparas. 4-1.17.1(e), 4-1.17.2(a), and 4-1.17.2(c) revised
		(18) In Section 4-1.18, paras. 4-1.18.1(b) and 4-1.18.6 revised; and para. 4-1.18.9 added
14	4-2.1.1	Revised
14	4-2.1.2	Subparagraph (b)(2) revised
14	4-2.1.3	(1) Revised (2) Subparagraph (i) deleted: former subparas. (j) and (k) redesignated (3) Subparagraph (k) added
14	4-2.1.4	(1) Subparagraphs (a), (b), and (d) through (f) revised (2) Subparagraph (g) added
15	4-2.1.5	Subparagraphs (a) and (b) revised
15	4-2.3.1	Revised in its entirety
15	4-2.3.2	Revised
16	4-2.3.3	Added and subsequent paragraphs redesignated
16	4-2.3.4	Former para. 4-2.3.3, redesignated and revised
16	4-2.4.2	Subparagraph (a)(7) added
16	4-2.4.4	Revised
16	4-2.4.5	Revised in its entirety
18	4-3.1.2	Subparagraph (a) revised
19	4-3.1.3	Subparagraphs (f) and (g) added
19	4-3.1.3.1.2	Revised
20	4-3.1.3.2.2	Subparagraph (c)(1) revised
20	4-3.1.3.3.1	Subparagraph (o) deleted and remaining subparagraphs redesignated
21	4-3.1.3.4	Revised
21	4-3.1.3.5	Added
21	4-3.2.1	Revised
23	4-3.2.3	Added
23	Section 4-3.3	(1) Paragraph 4-3.3.3 revised and subpara. (d) added (2) Paragraph 4-3.3.5 revised (3) Paragraph 4-3.3.6 revised (4) Paragraph 4-3.3.7 deleted and subsequent paragraph redesignated
25	4-3.4.2	(1) Revised in its entirety (2) Figure 4-3.4.2.1 and Table 4-3.4.2-1 deleted

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Figure 4-0.2.1-3 Portal Crane With Luffing Boom

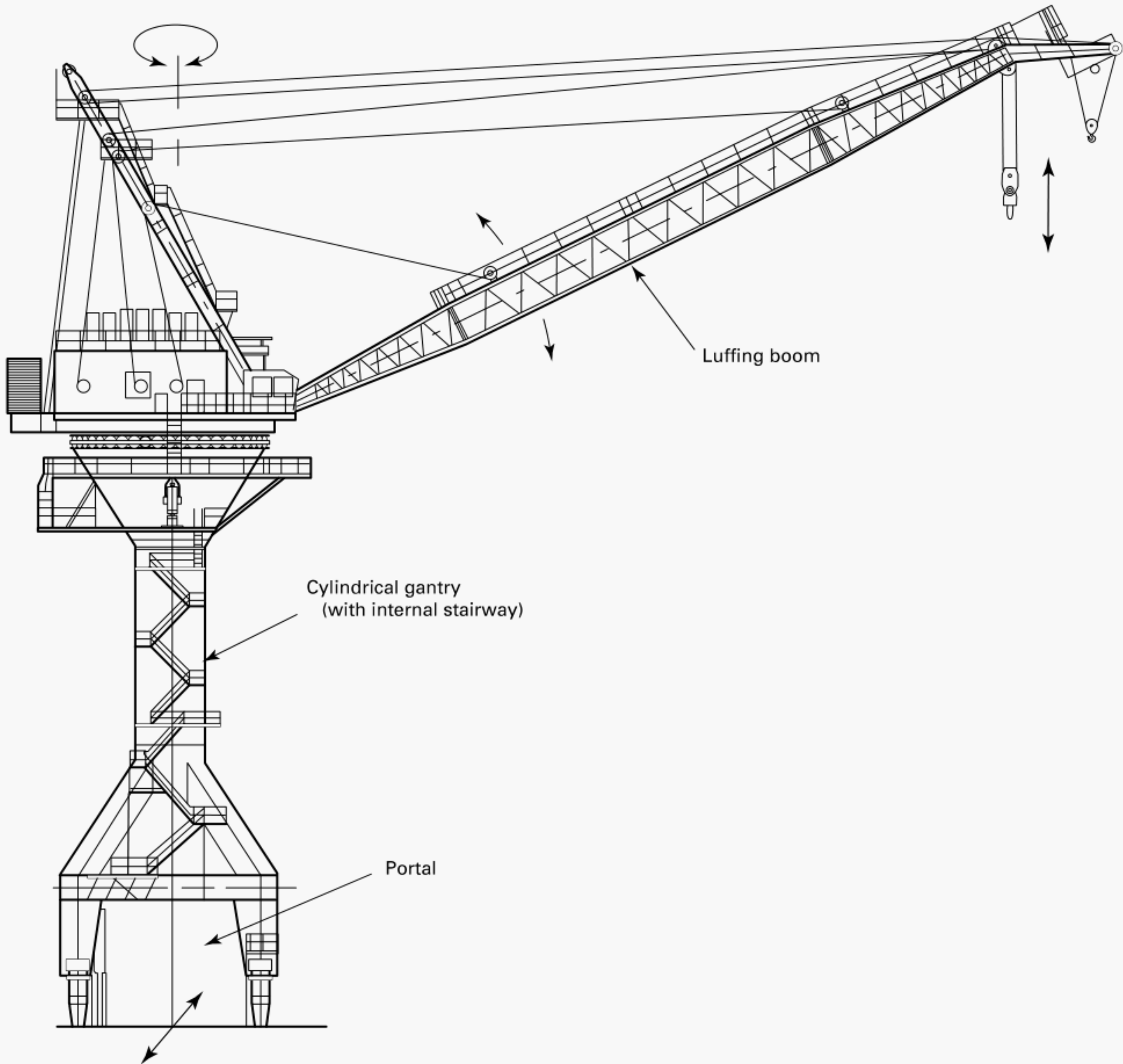


Figure 4-0.2.1-3 Portal Crane With Luffing Boom

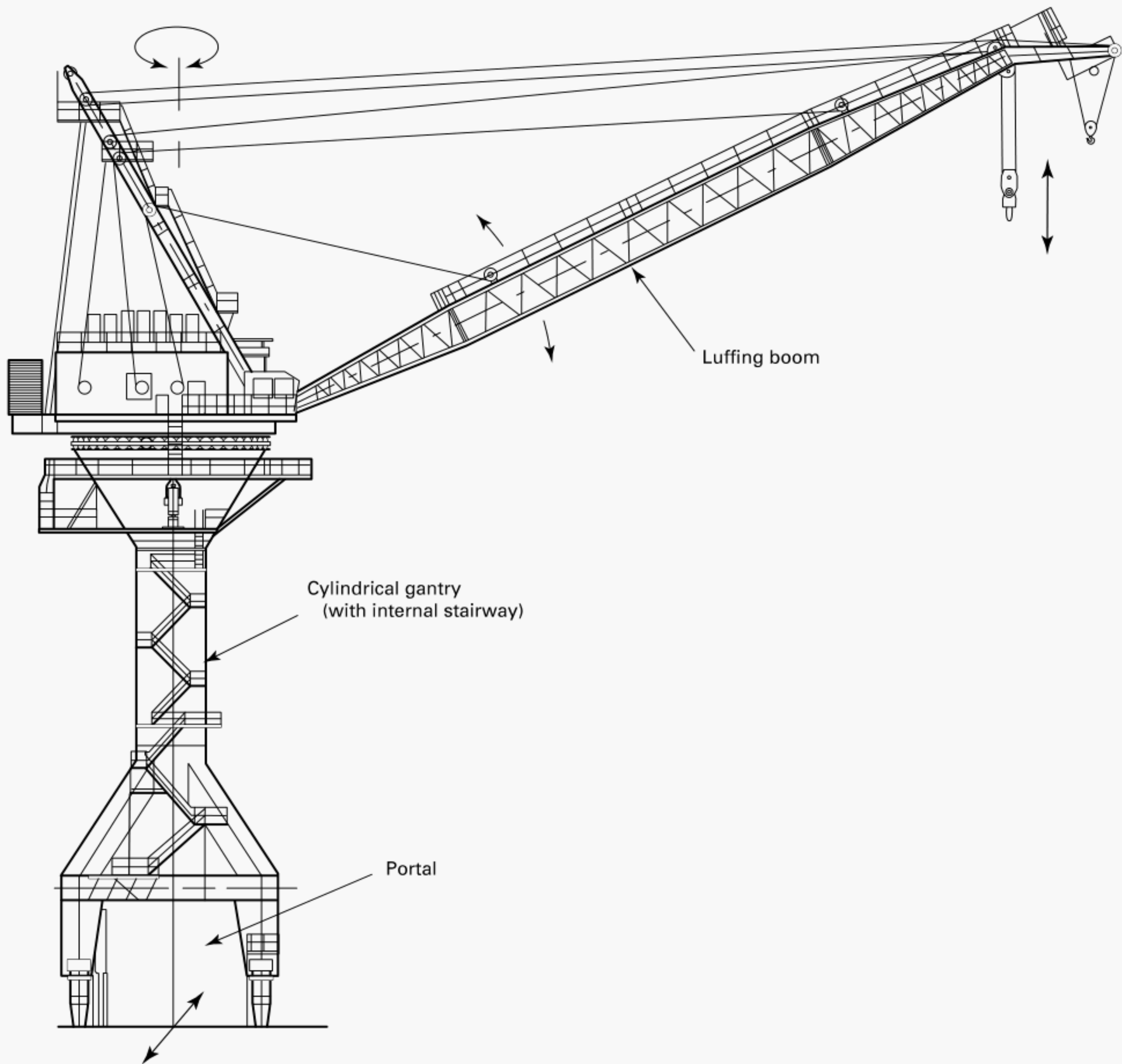


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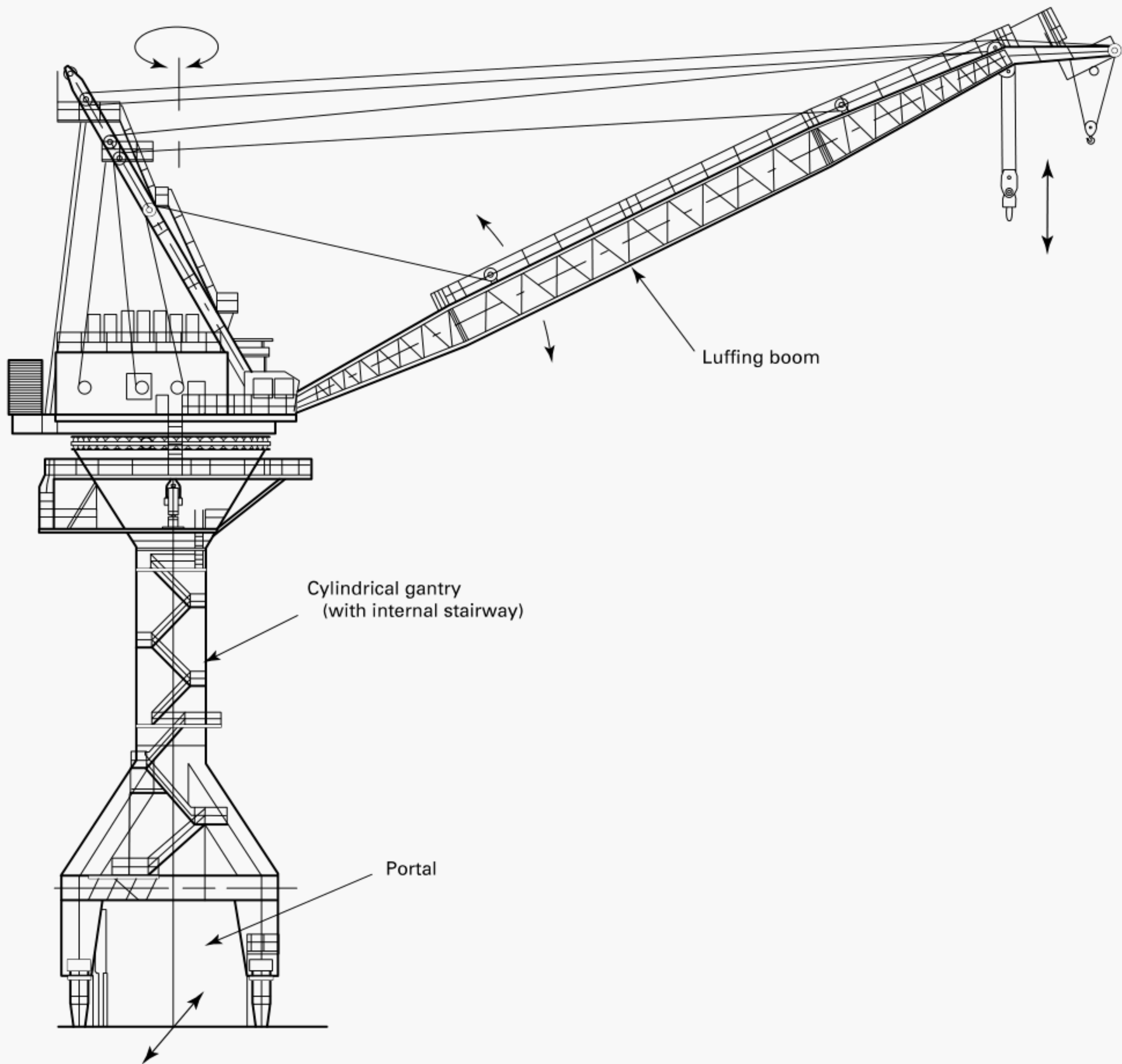


Figure 4-0.2.1-3 Portal Crane With Luffing Boom

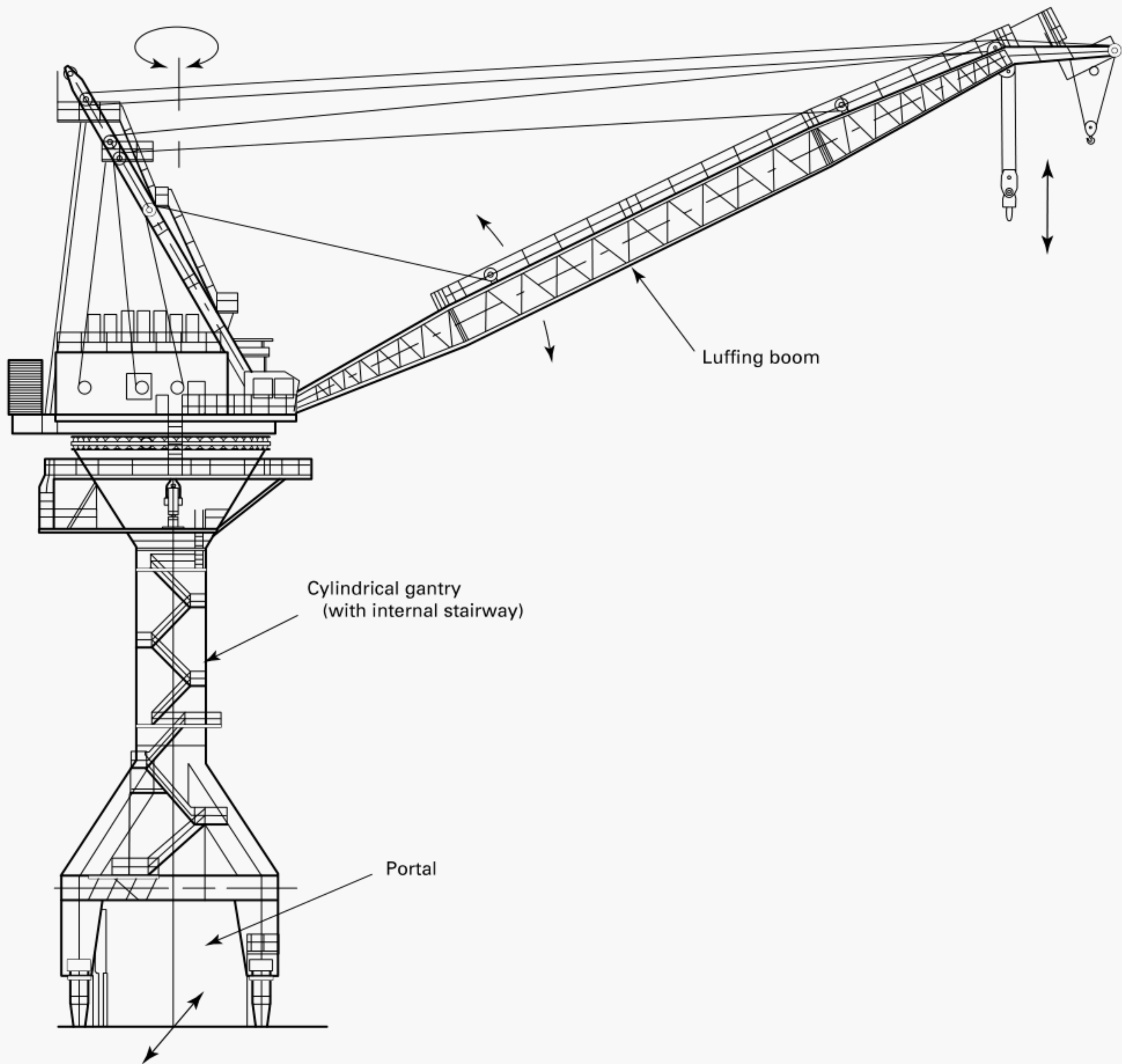


Figure 4-0.2.1-3 Portal Crane With Luffing Boom

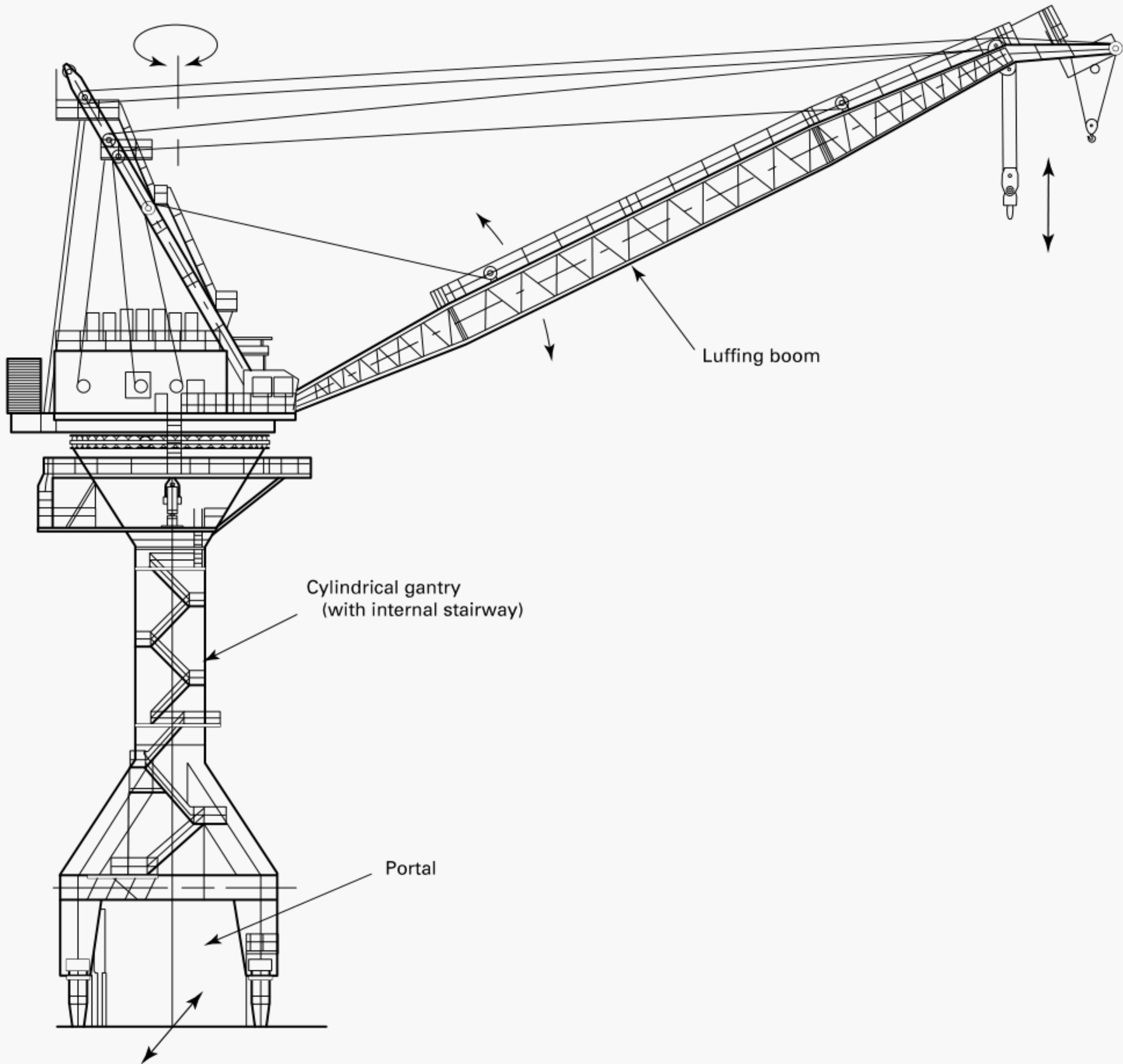
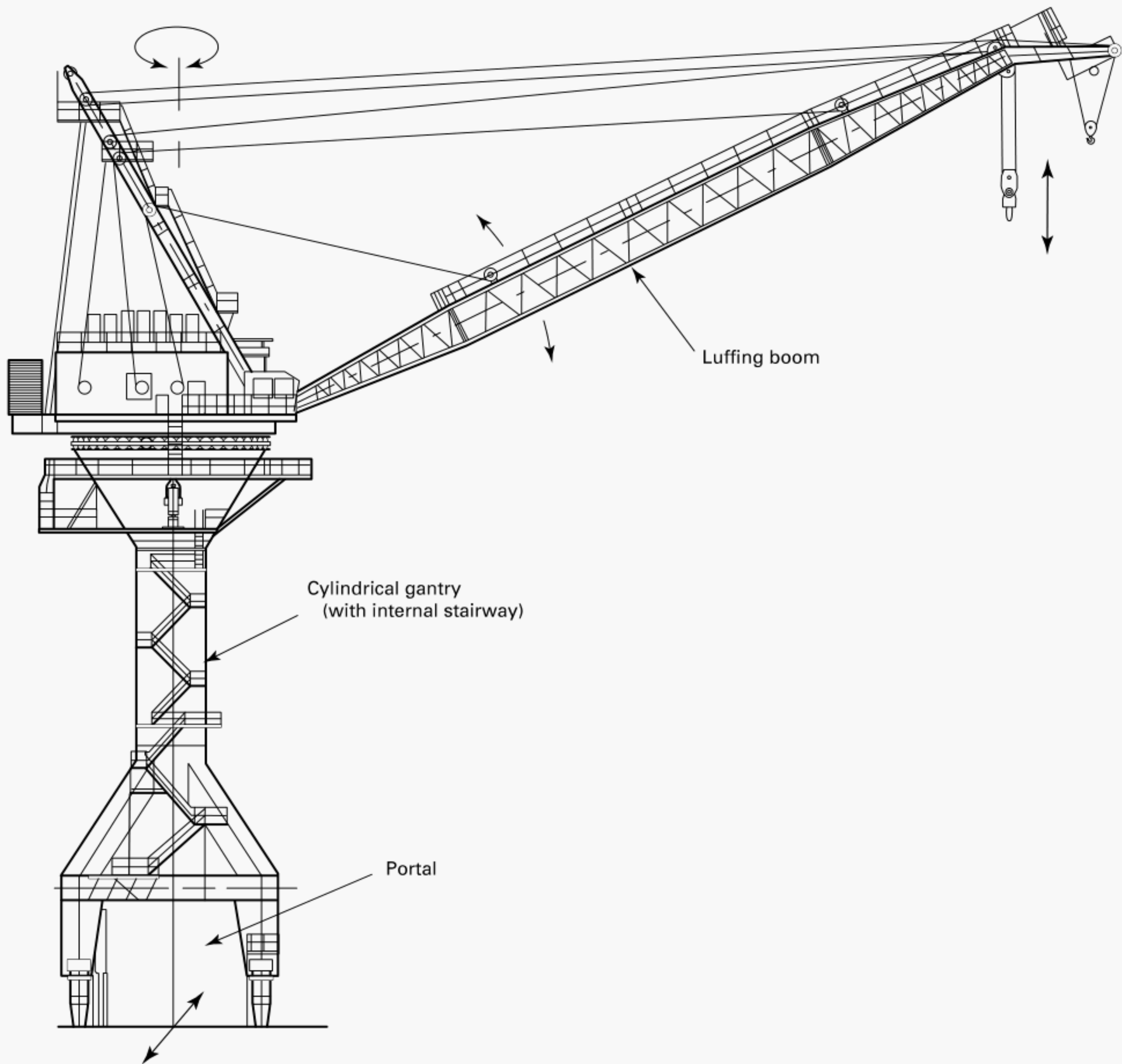


Figure 4-0.2.1-3 Portal Crane With Luffing Boom



(b) The drum(s) shall be provided with an auxiliary ratchet and pawl, or other positive locking device in addition to the brake required by [para. 4-1.5.3\(a\)](#) to hold the drum(s) indefinitely from rotating in the lowering direction.

(c) The drum(s) shall have sufficient rope capacity to operate the boom at all designed positions when using the manufacturer's recommended reeving and rope size.

(d) An integrally mounted holding device (such as a load hold check valve) shall be provided with boom support hydraulic cylinder(s) to prevent uncontrolled lowering of the boom in the event of a hydraulic system failure (e.g., supply hose rupture).

SECTION 4-1.7: SWING (SLEWING) MECHANISM

4-1.7.1 General Requirements

(a) The swing mechanism shall be capable of smooth starts and stops and of providing varying degrees of acceleration and deceleration.

(b) Cranes required to weathervane when out of service shall be equipped with means controllable from the operator's station that render the rotating upper structure free to rotate.

4-1.7.2 Swing Brakes and Locking Device

(a) A braking means with holding power in both directions shall be provided to prevent movement of the rotating upper structure during operation and shall be capable of being set in the holding position and remaining so without further action on the part of the operator.

(b) A device for locking the rotating upper structure should be provided. When provided, it shall be arranged for avoidance of inadvertent engagement or disengagement. If a locking device is provided, a visual or audible indicator shall be furnished to warn the operator of device engagement.

SECTION 4-1.8: TRAVEL EQUIPMENT

4-1.8.1 General Requirements

(a) Means shall be provided to prevent cranes from running into the bumpers or stops while under power. Means may include engineered or administrative controls [see [para. 4-1.1.1\(g\)](#)].

(b) Drives shall be capable of smooth starts and stops and of providing varying degrees of acceleration and deceleration. Provision should be made in the travel drive(s) to provide power characteristics that permit the crane to travel to a parking area, with or against the wind, if a wind alarm sounds.

(c) A warning signal shall automatically activate whenever the crane travels in order to warn persons in the vicinity.

(d) Means shall be provided to prevent crane travel from the effects of wind per ASCE SEI 7 when the crane is out of service.

4-1.8.2 Travel Trucks

(a) Crane trucks shall be fitted with sweeps extending to the top of the rail and placed in front of the leading wheels in either direction.

(b) Truck wheels shall be guarded.

(c) Means shall be provided to limit the drop of truck frames in case of wheel or axle breakage to a distance that will not cause the crane to overturn.

4-1.8.3 Travel Brakes

(a) Braking means shall be provided. A brake or other means shall be provided to hold the crane in position when not traveling and to lock the wheels against rotation to resist the effects of in-service wind and operational forces.

(b) Brakes shall automatically engage on loss of power or actuating pressure to the brake and when power is not applied to the travel drive.

SECTION 4-1.9: BRAKES, GENERAL REQUIREMENTS

(a) Brakes shall be arranged to permit adjustment where necessary to compensate for lining wear and maintain force in springs, where used.

(b) Brakes shall have heat dissipation capability consistent with service needs.

(c) Brakes shall be protected from the weather and from lubricants, hydraulic fluid, or other such liquids, and dirt.

(d) Where springs comprise part of the braking mechanism, they shall be subjected to compression only.

SECTION 4-1.10: LIFTING MAGNETS AND BELOW-THE-HOOK LIFTING DEVICES

Lifting magnets and other below-the-hook lifting devices shall comply with ASME B30.20.

SECTION 4-1.11: OPERATIONAL AIDS

(a) Indicating devices shall be provided to

(1) display the weight of the load on the hook

(2) display the luffing boom angle and/or operating radius

(3) indicate the rotation of boom and hoist drums

(b) Motion-limiting devices shall be provided to

(1) limit load hoist upward motion to prevent two-blocking

(2) limit load hoist downward motion to maintain the minimum rope on the drum per ASME B30.30

(b) The drum(s) shall be provided with an auxiliary ratchet and pawl, or other positive locking device in addition to the brake required by [para. 4-1.5.3\(a\)](#) to hold the drum(s) indefinitely from rotating in the lowering direction.

(c) The drum(s) shall have sufficient rope capacity to operate the boom at all designed positions when using the manufacturer's recommended reeving and rope size.

(d) An integrally mounted holding device (such as a load hold check valve) shall be provided with boom support hydraulic cylinder(s) to prevent uncontrolled lowering of the boom in the event of a hydraulic system failure (e.g., supply hose rupture).

SECTION 4-1.7: SWING (SLEWING) MECHANISM

4-1.7.1 General Requirements

(a) The swing mechanism shall be capable of smooth starts and stops and of providing varying degrees of acceleration and deceleration.

(b) Cranes required to weathervane when out of service shall be equipped with means controllable from the operator's station that render the rotating upper structure free to rotate.

4-1.7.2 Swing Brakes and Locking Device

(a) A braking means with holding power in both directions shall be provided to prevent movement of the rotating upper structure during operation and shall be capable of being set in the holding position and remaining so without further action on the part of the operator.

(b) A device for locking the rotating upper structure should be provided. When provided, it shall be arranged for avoidance of inadvertent engagement or disengagement. If a locking device is provided, a visual or audible indicator shall be furnished to warn the operator of device engagement.

SECTION 4-1.8: TRAVEL EQUIPMENT

4-1.8.1 General Requirements

(a) Means shall be provided to prevent cranes from running into the bumpers or stops while under power. Means may include engineered or administrative controls [see [para. 4-1.1.1\(g\)](#)].

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(c) A warning signal shall automatically activate whenever the crane travels in order to warn persons in the vicinity.

(d) Means shall be provided to prevent crane travel from the effects of wind per ASCE SEI 7 when the crane is out of service.

4-1.8.2 Travel Trucks

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(c) A warning signal shall automatically activate whenever the crane travels in order to warn persons in the vicinity.

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(c) A warning signal shall automatically activate whenever the crane travels in order to warn persons in the vicinity.

(d) Means shall be provided to prevent crane travel from the effects of wind per ASCE SEI 7 when the crane is out of service.

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Chapter 4-3

Operation

SECTION 4-3.1: QUALIFICATIONS AND RESPONSIBILITIES

4-3.1.1 Operators

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

(1) designated persons.

(2) trainees under the supervision of a designated person. The number of trainees permitted to be supervised by a single designated person, the physical location of the designated person while supervising, and the type of communication required between the designated person and trainee shall be determined by a qualified person.

(3) maintenance and test personnel, when it is necessary in the performance of their duties.

(4) inspectors (crane).

(b) No one, other than personnel specified in (a) above, shall enter a crane cab with the exception of persons such as oilers, supervisors, and those specific persons authorized by supervisors whose duties require them to do so and then only in the performance of their duties and with the knowledge of the operator.

(20) 4-3.1.2 Qualifications for Operators

(a) Operators shall pass a practical operating examination. Examination may be limited to the specific type of crane (portal, pedestal) that will be operated.

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

(1) Have vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.

(2) Be able to distinguish colors, regardless of position, if color differentiation is required for operation.

(3) Hearing, with or without hearing aid, shall be adequate to meet operational demands.

(4) Have sufficient strength, endurance, agility, coordination, and speed of reaction to meet the demands of equipment operation.

(5) No evidence of physical defects, or emotional instability that could pose a hazard to the operator or others, or, which in the opinion of the examiner could interfere with the operator's performance. Such evidence

may be sufficient reason for disqualification. In such cases, specialized clinical or medical judgments and tests may be required.

(6) No evidence of being subject to seizures or loss of physical control. Such evidence shall be sufficient reason for disqualification. Specialized medical tests may be required to determine these conditions.

(7) Operators and operator trainees should have normal depth perception, field of vision, reaction time, manual dexterity, coordination, and no tendencies to dizziness or similar undesirable characteristics.

(8) A negative result on a substance abuse test. The level of testing will be determined by the current standard practice for the industry where the crane is employed, and the test results shall be confirmed by a recognized laboratory service.

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

(1) evidence of successfully passing a physical examination as defined in (b) above

(2) satisfactory completion of a written examination covering operational characteristics, controls, and emergency control skills, such as response to fire or control malfunction, as well as characteristic and performance questions appropriate to the crane type for which qualification is being sought

(3) demonstrated ability to read, write, comprehend, and use arithmetic and a load/capacity chart in the English language

(4) satisfactory completion of a combination written and verbal test on load/capacity chart usage that covers a selection of the configurations the crane may be equipped to handle, for the crane type for which qualification is being sought

(5) satisfactory completion of testing by appropriate written, oral, or practical methods demonstrating proficiency in operating the specific crane type, including prestart and poststart inspections, shutdown, and securing procedures

(6) demonstrated understanding of the applicable sections of the B30 Standard and federal, state, and local requirements

(d) Operators who have successfully qualified to operate a specific crane type shall be required to be requalified if supervision deems it necessary. Requalification

shall include, but not be limited to, requirements in (c)(1) through (c)(5) above.

(20) 4-3.1.3 Responsibilities

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

(a) *crane operator*: directly controls the crane's functions.

(b) *crane owner*: has custodial control of a crane by virtue of lease or ownership.

(c) *crane user*: arranges the crane's presence on a worksite and controls its use there.

(d) *lift director*: directly oversees the work being performed by a crane and the associated rigging crew.

(e) *site supervisor*: exercises supervisory control over the worksite on which a crane is being used and over the work that is being performed on that site.

(f) *rigger*: ensures load weights are known, rigging gear is properly selected and attached, and loads are balanced and guided when necessary.

(g) *signalperson*: provides signals to the operator.

4-3.1.3.1 Responsibilities of the Crane Owner and Crane User. In some situations, the owner and user may be the same entity and is therefore accountable for all of the following responsibilities. In other cases, the user may lease or rent a crane from the owner without supervisory, operational, maintenance, support personnel, or services from the owner. In these situations, paras. 4-3.1.3.1.1 and 4-3.1.3.1.2 shall apply.

4-3.1.3.1.1 The crane owner's responsibilities shall include the following:

(a) providing a crane that meets the requirements of Chapters 4-1 and 4-2, as well as specific job requirements defined by the user

(b) providing a crane and all necessary components, specified by the manufacturer, that meets the user's requested configuration and capacity

(c) providing all applicable load/capacity chart(s) and diagrams

(d) providing additional technical information pertaining to the crane, necessary for crane operation, when requested by the crane user

(e) providing field assembly, disassembly, operation, maintenance information, and warning decals and placards installed as prescribed by the crane manufacturer

(f) establishing an inspection, testing, and maintenance program in accordance with Chapter 4-2 and informing the crane user of the requirements of this program

(g) designating personnel for the purposes of inspection, maintenance, repair, transport, assembly, and disassembly

4-3.1.3.1.2 The crane user's responsibilities shall include the following: (20)

(a) complying with the requirements of this Volume, manufacturer's requirements, and those regulations applicable at the worksite

(b) designating personnel to supervise crane activities

(c) ensuring that the crane is in proper operating condition prior to initial use at the worksite by

(1) verifying that the crane owner has provided documentation that the crane meets the inspection and test requirements of paras. 4-2.1.3 and 4-2.1.4 and Sections 4-2.3 and 4-2.5.

(2) verifying that a frequent inspection has been performed as defined in para. 4-2.1.3

(d) verifying that the crane has the necessary lifting capacity to perform the proposed lifting operations in the planned configuration

(e) using crane operators that meet the requirements of para. 4-3.1.2 and are qualified to perform the tasks that will be required with the crane to which they are assigned to operate

(f) ensuring the designated operator(s) has been notified of adjustments or repairs that have not yet been completed, prior to commencing crane operations

(g) designating personnel for inspections as required in Sections 4-2.1 and 4-2.5

(h) designating personnel for the purposes of maintenance, repair, transport, assembly, and disassembly, as applicable

(i) ensuring that all personnel involved in maintenance, repair, transport, assembly, disassembly, and inspection, as applicable, are aware of their responsibilities, assigned duties, and the associated hazards

(j) ensuring that the inspection, testing, and maintenance programs specified by the crane owner are followed

4-3.1.3.2 Responsibilities of Site Supervisor and Lift Director. In some situations, the site supervisor and lift director may be the same person.

4-3.1.3.2.1 The site supervisor's responsibilities shall include the following:

(a) ensuring that the crane meets the requirements of Chapter 4-2 prior to initial site usage.

(b) determining if additional regulations are applicable to crane operations.

(c) ensuring that a qualified person is designated as the lift director.

(d) ensuring that crane operations are coordinated with other jobsite activities that will be affected by or will affect lift operations.

(e) ensuring that the area for the crane is adequately prepared. The preparation includes, but is not limited to, traffic control as necessary to restrict unauthorized access to the crane's working area.

(f) ensuring that crane operators meet the requirements of [para. 4-3.1.2](#).

(g) ensuring that conditions that may adversely affect crane operations are addressed. Such conditions include, but are not limited to, the following:

- (1) wind velocity or gusting winds
- (2) heavy rain
- (3) fog
- (4) extreme cold
- (5) artificial lighting
- (6) river traffic

(h) allowing crane operation near electric power lines only when the requirements of [para. 4-3.4.2](#) are met.

(i) permitting special lifting operations only when equipment and procedures required by this Volume, the crane manufacturer, or a qualified person are employed. Such operations include, but are not limited to, the following:

- (1) multiple crane lifts
- (2) lifting personnel

(j) designating a person to supervise the work performed by the rigging crew.

(k) designating a person to perform crane maintenance.

(i) ensuring precautions are implemented when hazards associated with special lifting operations are present. Such operations include, but are not limited to, the following:

- (1) multiple crane lifts
- (2) lifting personnel

(j) ensuring that the applicable requirements of ASME B30.23 are met when lifting personnel.

(k) informing the crane operator of the weight of loads to be lifted, as well as the lifting, moving, and placing locations for these loads.

(l) obtaining the crane operator's verification that this weight does not exceed the crane's rated capacity.

(m) designating personnel to perform the crane's load rigging.

(n) ensuring that the load is properly rigged and balanced before it is lifted more than a few inches.

4-3.1.3.3 Responsibilities of Crane Operators. The operator shall be responsible for the following listed items. The operator shall not be responsible for hazards or conditions that are not under his direct control and that adversely affect the lift operations. Whenever the operator has doubt as to the safety of operations, the operator shall stop the crane's functions in a controlled manner. Lift operations shall resume only after safety concerns have been addressed or the continuation of crane operations is directed by the lift director.

4-3.1.3.3.1 The operator's responsibilities shall (20) include the following:

(a) reviewing the requirements for the crane with the lift director before operations.

(b) knowing what types of site conditions could adversely affect the operation of the crane and consulting with the lift director concerning the possible presence of those conditions.

(c) understanding and applying the information contained in the crane manufacturer's operating manual.

(d) understanding the crane's functions and limitations, as well as its particular operating characteristics.

(e) using the crane's load/capacity chart(s) and diagrams and applying all notes and warnings related to the charts to confirm the correct crane configuration to suit the load, site, and lift conditions.

(f) refusing to operate the crane when any portion of the load or crane would enter the danger zone of energized power lines as referenced in [para. 4-3.4.2](#).

(g) performing a daily inspection of the crane as specified in [para. 4-2.1.2](#).

(h) promptly reporting the need for any adjustments or repairs to a designated person.

(i) following applicable lock-out/tag-out procedures.

(j) not operating the crane when physically or mentally unfit.

(20) **4-3.1.3.2.2** The lift director's responsibilities shall include the following:

(a) being present at the jobsite during lifting operations.

(b) stopping crane operations if alerted to an unsafe condition affecting those operations.

(c) ensuring that the preparation of the area needed to support crane operations has been completed before operations commence.

(d) ensuring necessary traffic controls are in place to restrict unauthorized access to the crane's work area.

(e) ensuring that personnel involved in crane operations understand their responsibilities, assigned duties, and the associated hazards.

(f) addressing safety concerns raised by the operator or other personnel and being responsible if it is decided to overrule those concerns and crane operations are directed to continue. (In all cases, the manufacturer's criteria for safe operation and the requirements of this Volume shall be adhered to.)

(g) designating a signalperson(s) and conveying that information to the crane operator.

(h) allowing crane operation near electric power lines only when the requirements of [para. 4-3.4.2](#) and any additional requirements determined by the site supervisor have been met.

(k) ensuring that all controls are in the off or neutral position and that all personnel are in the clear before energizing the crane or starting the engine.

(l) not engaging in any practice that will divert his attention while actually operating the crane controls.

(m) testing the crane function controls that will be used and operating only if those function controls respond properly.

(n) operating the crane's functions, under normal operating conditions, in a smooth and controlled manner.

(o) knowing how to travel the crane.

(p) ensuring that the load and rigging weight(s) have been provided.

(q) calculating or determining the net capacity for all configurations that will be used and verifying, using the load/capacity chart(s), that the crane has sufficient net capacity for the proposed lift.

(r) considering all factors known that might affect the crane capacity and informing the lift director of the need to make appropriate adjustments.

(s) knowing the standard and special signals as specified in [Section 4-3.3](#) and responding to such signals from the person who is directing the lift or a designated signalperson. (When a signalperson is not required as part of the lift operation, the operator is then responsible for the movement of the crane. However, the operator shall obey a stop signal at all times, no matter who gives it.)

(t) understanding basic load rigging procedures. For responsibility of rigging the load and ensuring that the load is rigged properly, see [para. 4-3.1.3.4](#).

(u) if power fails during operations

(1) setting all brakes and locking devices

(2) moving all clutch or other power controls to the off or neutral position

(3) landing any load suspended below the hook under brake control, if practical

(v) before leaving the crane unattended

(1) landing any load suspended below the hook.

(2) disengaging the master clutch.

(3) setting hoist brakes, swing brakes, boom brakes, and other locking devices.

(4) putting controls in the off or neutral position.

(5) stopping the engine. An exception to this may exist when crane operation is frequently interrupted during a shift, and the operator must leave the crane. Under these circumstances, the engine may remain running, and (1) through (4) above shall apply. The operator shall be situated where any entry to the crane can be observed.

(6) considering the recommendations of the manufacturer for securing the crane, when a local weather storm warning exists.

(20) **4-3.1.3.4 Rigger's Responsibilities.** The rigger's responsibility is to ensure the following:

(a) the weight of the load and its approximate center of gravity have been obtained, provided, or calculated

(b) the proper rigging equipment is selected, inspected, and complies with the applicable operating practices according to the criteria of the applicable ASME B30 volume (e.g., B30.9, B30.10, B30.20, B30.23, B30.26)

(c) the rated load of the rigging equipment selected is sufficient for the load to be handled, based on the number of legs, hitch configuration, and effects of angles

(d) the rigging equipment is properly attached to the hook, shackle, or other load-handling device

(e) the rigging equipment is adequately protected from abrasion, cutting, or other damage during load handling activities

(f) the load is rigged to be balanced and stable

(g) a tag line(s) is installed and used when additional load control is required

4-3.1.3.5 Signalperson Responsibilities. The signalperson shall at a minimum be responsible for the following: (20)

(a) identifying himself/herself as the signalperson to the load handling equipment operator(s) before commencing a load handling activity

(b) confirming with the operator the method of communication and the associated signals that are to be used during the load handling activity

(c) ensuring that standard, discernible hand or voice signals provided to the operator are in accordance with [paras. 4-3.3.4](#) and [4-3.3.5](#)

(d) verifying that load handling activities are stopped if there is a need to give instructions to the operator, other than those provided by the established signal system

(e) ensuring that telephones, radios, or other equipment intended for use as the primary signal system are tested prior to the load handling activity

(f) ensuring that a form of communication is maintained with the operator during all load handling activities

(g) ensuring that all directions given to the operator shall be given from the operator's perspective (e.g., swing right)

(h) ensuring that each series of voice signals contains three elements as noted in [para. 4-3.3.5\(d\)](#)

(i) ensuring that special signals (when needed) that are not covered by [para. 4-3.3.2](#) do not conflict with standard signals

(j) avoiding giving signal commands that would result in loads being lifted over personnel whenever possible

SECTION 4-3.2: OPERATING PRACTICES

4-3.2.1 Handling the Load

(20)

(a) *Size of Load*

(1) No crane shall be loaded beyond the specifications of the load rating chart for its existing configuration except for test purposes as provided in [paras. 4-2.3.2](#) and [4-2.3.3](#).

(2) For lifts where the load weight is not accurately known, the lift director shall ascertain that the weight of the load does not exceed the crane ratings at the radius at which the load is to be lifted.

(b) Operational Aids

(1) Indicating devices shall be checked daily before the crane is put in operation (see [para. 4-2.1.3](#)).

(2) Load indicator readings shall be used to guide crane operations within the specifications of the load rating chart, except when load weight is accurately known from another source.

(3) Luffing boom angle or radius indicator readings shall be used to guide crane operations within the specifications of the load rating chart; however, measured operating radii shall always govern over indicated boom angles or radii.

(4) When a load-limiting device, luffing boom angle, or load or radius indicator is inoperative or malfunctioning, the crane may be kept in-service while awaiting repair, provided all of the following conditions are adhered to. No operations shall be conducted if more than one of the indicating or limiting devices are not functioning.

(-a) All crane operations are conducted under the direct supervision of a qualified person other than signalperson.

(-b) Radio communications between the qualified person, signalperson(s), and crane operator are established.

(-c) Each individual lift and the first of a series of identical repetitious lifts are specifically approved by the qualified person before the lift is made, with respect to load weight, operating radii, lift heights, and crane motions.

(5) When the wind velocity-indicating device is nonfunctioning, crane operations may continue if another crane on the site is equipped with a functioning wind velocity indicator or if a qualified person determines that ambient wind velocity is within permitted limits.

(6) When drum rotation indicators are not functioning, the crane may be kept in-service while awaiting repair.

(c) Attaching the Load

(1) The hoist rope shall not be wrapped around the load.

(2) The load shall be attached to the hook by means of slings or other devices of adequate capacity.

(d) Holding the Load

(1) The operator shall not leave the controls while the load is suspended.

(2) No person should be permitted to stand or pass under a suspended load.

(3) If the load must remain suspended for any considerable length of time, the operator shall keep the drum from rotating in the lowering direction by acti-

vating the drum-holding device, if a separate nonautomatic device has been provided.

(4) As an exception to (1) above, where a load is to be held suspended for a period of time exceeding normal lifting operations, the operator may leave the controls, provided that prior to that time, the appointed individual and operator shall have established the requirements for restraining the load, swing, and travel functions and provided barricades or whatever other precautions may be necessary.

(e) Moving the Load

(1) The lift director shall ensure that

(-a) proper slings or other lifting attachments are being used

(-b) the load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches

(-c) the lift and swing path is clear of obstructions

(2) Before starting to lift, the following conditions should be noted:

(-a) The hoist rope shall not be kinked.

(-b) Multiple part lines shall not be twisted around each other.

(-c) The hook shall be brought over the load in such a manner as to minimize swinging.

(-d) If there is a slack rope condition, it shall be determined that the rope is seated on the drum and in the sheaves, as the slack is removed.

(-e) The effect of wind on the load and on the crane should be noted.

(-f) The load is free to be lifted; it is not caught on, nor attached to, other objects.

(3) During lifting, care shall be taken that

(-a) there is no sudden acceleration or deceleration of the moving load

(-b) the load does not contact any obstructions

(4) Side loading of booms shall be limited to freely suspended loads. Cranes should not be used for dragging loads.

(5) The operator should avoid carrying loads over people.

(6) The operator shall test the brakes each time a load approaching the rated load is handled by lifting it a few inches and applying the brakes.

(7) The load shall not be lowered below the point where less than two full wraps of rope remain on the drum.

(8) When swinging the boom or traveling the crane, sudden starts and stops shall be avoided. Swing and travel speeds shall be such that the load does not swing out beyond the radius at which it can be controlled. A tag or restraint line shall be used when swinging of the load is hazardous.

(9) Consideration should be given to the effects of wind on loads with a large sail area.

4-3.2.2 Personnel Lifting

This Volume recognizes that portal and pedestal cranes are designed and intended for handling materials and not personnel. Personnel are only permitted to ride in a personnel platform supported by the crane load line attachment or boom-mounted platform when used in accordance with the requirements of ASME B30.23 and the crane manufacturer's instructions. The crane shall not be used for other purposes while handling personnel. (Refer to ASME B30.23.)

(20) 4-3.2.3 Critical Lifts

Certain lifting operations are recognized to have increased levels of risk to personnel or property. The criteria to categorize a lift as "critical" on this basis are established by site supervision, project management, a qualified person, or company policies. Lift planning and oversight shall be tailored to each operation and shall be sufficient to manage varying conditions and their associated hazards. ASME P30.1, Planning for Load Handling Activities, or an equivalent lift planning tool should be used when the lifting operation is deemed to be "critical."

(20) SECTION 4-3.3: SIGNALS

4-3.3.1 General

(a) Communication between the crane operator and signalperson shall be maintained continuously during all crane movements. If at any time communication is disrupted, the operator shall stop all crane movements until communication is restored and a proper signal is given and understood.

(b) If the operator has any concerns regarding the requested movement of the crane or needs to communicate with the signalperson, the operator shall stop all crane movement. Crane movement shall not resume until the operator and signalperson agree the issue at hand has been resolved.

(c) If it is desired to give instructions to the operator, other than those provided by the established signal system, the crane movements shall be stopped.

4-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in [para. 4-3.3.4](#) or [4-3.3.5](#). Signals shall be discernible or audible at all times. No crane motion shall be made unless signals are clearly understood.

4-3.3.3 Signalperson Qualifications

Prior to signaling crane operations, signalpersons shall be tested by a designated person and demonstrate their qualifications in the following areas:

(a) basic understanding of crane operation and limitations

(b) standard hand signals described in [para. 4-3.3.4](#) whenever hand signals are used

(c) standard voice signals described in [para. 4-3.3.5](#) whenever voice signals are used

(d) responsibilities addressed in [para. 4-3.1.3.5](#)

4-3.3.4 Standard Hand Signals

Hand signals shall be in accordance with [Figure 4-3.3.4-1](#) and shall be posted at the worksite.

4-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the lift director, the crane operator, and the appointed signalperson.

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the jobsite.

(b) Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

(c) All directions given to the crane operator by the signalperson shall be given from the operator's direction perspective (e.g., swing right).

(d) Each series of voice signals shall contain three elements stated in the following order:

- (1) function and direction
- (2) distance and/or speed
- (3) function stop

NOTE: The following are some examples of signals:

- (a) swing right 50 ft, 25 ft, 15 ft, 10 ft, 5 ft, 2 ft, swing stop
- (b) load down 100 ft, 50 ft, 40 ft, 30 ft, ... 2 ft, load stop
- (c) load up slow, slow, slow, load stop

(e) For load handling operations using voice signals, the person directing operations shall consider the complexity of the lift, the capabilities of the particular crane, the experience and skill of the operator and signalperson, and the ability to communicate the necessary signals before permitting multiple simultaneous crane function signals.

4-3.3.6 Special Signals

For operations not covered by [para. 4-3.3.4](#) or [4-3.3.5](#) additions to or modifications of the standard signals may be required. In such cases, the required special signals shall be agreed upon in advance by the lift director, operator, and signalperson. These special signals should not be in conflict with the standard signals.

4-3.2.2 Personnel Lifting

This Volume recognizes that portal and pedestal cranes are designed and intended for handling materials and not personnel. Personnel are only permitted to ride in a personnel platform supported by the crane load line attachment or boom-mounted platform when used in accordance with the requirements of ASME B30.23 and the crane manufacturer's instructions. The crane shall not be used for other purposes while handling personnel. (Refer to ASME B30.23.)

(20) 4-3.2.3 Critical Lifts

Certain lifting operations are recognized to have increased levels of risk to personnel or property. The criteria to categorize a lift as "critical" on this basis are established by site supervision, project management, a qualified person, or company policies. Lift planning and oversight shall be tailored to each operation and shall be sufficient to manage varying conditions and their associated hazards. ASME P30.1, Planning for Load Handling Activities, or an equivalent lift planning tool should be used when the lifting operation is deemed to be "critical."

(20) SECTION 4-3.3: SIGNALS

4-3.3.1 General

(a) Communication between the crane operator and signalperson shall be maintained continuously during all crane movements. If at any time communication is disrupted, the operator shall stop all crane movements until communication is restored and a proper signal is given and understood.

(b) If the operator has any concerns regarding the requested movement of the crane or needs to communicate with the signalperson, the operator shall stop all crane movement. Crane movement shall not resume until the operator and signalperson agree the issue at hand has been resolved.

(c) If it is desired to give instructions to the operator, other than those provided by the established signal system, the crane movements shall be stopped.

4-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in [para. 4-3.3.4](#) or [4-3.3.5](#). Signals shall be discernible or audible at all times. No crane motion shall be made unless signals are clearly understood.

4-3.3.3 Signalperson Qualifications

Prior to signaling crane operations, signalpersons shall be tested by a designated person and demonstrate their qualifications in the following areas:

(a) basic understanding of crane operation and limitations

(b) standard hand signals described in [para. 4-3.3.4](#) whenever hand signals are used

(c) standard voice signals described in [para. 4-3.3.5](#) whenever voice signals are used

(d) responsibilities addressed in [para. 4-3.1.3.5](#)

4-3.3.4 Standard Hand Signals

Hand signals shall be in accordance with [Figure 4-3.3.4-1](#) and shall be posted at the worksite.

4-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the lift director, the crane operator, and the appointed signalperson.

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the jobsite.

(b) Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

(c) All directions given to the crane operator by the signalperson shall be given from the operator's direction perspective (e.g., swing right).

(d) Each series of voice signals shall contain three elements stated in the following order:

- (1) function and direction
- (2) distance and/or speed
- (3) function stop

NOTE: The following are some examples of signals:

- (a) swing right 50 ft, 25 ft, 15 ft, 10 ft, 5 ft, 2 ft, swing stop
- (b) load down 100 ft, 50 ft, 40 ft, 30 ft, ... 2 ft, load stop
- (c) load up slow, slow, slow, load stop

(e) For load handling operations using voice signals, the person directing operations shall consider the complexity of the lift, the capabilities of the particular crane, the experience and skill of the operator and signalperson, and the ability to communicate the necessary signals before permitting multiple simultaneous crane function signals.

4-3.3.6 Special Signals

For operations not covered by [para. 4-3.3.4](#) or [4-3.3.5](#) additions to or modifications of the standard signals may be required. In such cases, the required special signals shall be agreed upon in advance by the lift director, operator, and signalperson. These special signals should not be in conflict with the standard signals.

4-3.2.2 Personnel Lifting

This Volume recognizes that portal and pedestal cranes are designed and intended for handling materials and not personnel. Personnel are only permitted to ride in a personnel platform supported by the crane load line attachment or boom-mounted platform when used in accordance with the requirements of ASME B30.23 and the crane manufacturer's instructions. The crane shall not be used for other purposes while handling personnel. (Refer to ASME B30.23.)

(20) 4-3.2.3 Critical Lifts

Certain lifting operations are recognized to have increased levels of risk to personnel or property. The criteria to categorize a lift as "critical" on this basis are established by site supervision, project management, a qualified person, or company policies. Lift planning and oversight shall be tailored to each operation and shall be sufficient to manage varying conditions and their associated hazards. ASME P30.1, Planning for Load Handling Activities, or an equivalent lift planning tool should be used when the lifting operation is deemed to be "critical."

(20) SECTION 4-3.3: SIGNALS

4-3.3.1 General

(a) Communication between the crane operator and signalperson shall be maintained continuously during all crane movements. If at any time communication is disrupted, the operator shall stop all crane movements until communication is restored and a proper signal is given and understood.

(b) If the operator has any concerns regarding the requested movement of the crane or needs to communicate with the signalperson, the operator shall stop all crane movement. Crane movement shall not resume until the operator and signalperson agree the issue at hand has been resolved.

(c) If it is desired to give instructions to the operator, other than those provided by the established signal system, the crane movements shall be stopped.

4-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in [para. 4-3.3.4](#) or [4-3.3.5](#). Signals shall be discernible or audible at all times. No crane motion shall be made unless signals are clearly understood.

4-3.3.3 Signalperson Qualifications

Prior to signaling crane operations, signalpersons shall be tested by a designated person and demonstrate their qualifications in the following areas:

(a) basic understanding of crane operation and limitations

(b) standard hand signals described in [para. 4-3.3.4](#) whenever hand signals are used

(c) standard voice signals described in [para. 4-3.3.5](#) whenever voice signals are used

(d) responsibilities addressed in [para. 4-3.1.3.5](#)

4-3.3.4 Standard Hand Signals

Hand signals shall be in accordance with [Figure 4-3.3.4-1](#) and shall be posted at the worksite.

4-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the lift director, the crane operator, and the appointed signalperson.

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the jobsite.

(b) Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

(c) All directions given to the crane operator by the signalperson shall be given from the operator's direction perspective (e.g., swing right).

(d) Each series of voice signals shall contain three elements stated in the following order:

- (1) function and direction
- (2) distance and/or speed
- (3) function stop

NOTE: The following are some examples of signals:

- (a) swing right 50 ft, 25 ft, 15 ft, 10 ft, 5 ft, 2 ft, swing stop
- (b) load down 100 ft, 50 ft, 40 ft, 30 ft, ... 2 ft, load stop
- (c) load up slow, slow, slow, load stop

(e) For load handling operations using voice signals, the person directing operations shall consider the complexity of the lift, the capabilities of the particular crane, the experience and skill of the operator and signalperson, and the ability to communicate the necessary signals before permitting multiple simultaneous crane function signals.

4-3.3.6 Special Signals

For operations not covered by [para. 4-3.3.4](#) or [4-3.3.5](#) additions to or modifications of the standard signals may be required. In such cases, the required special signals shall be agreed upon in advance by the lift director, operator, and signalperson. These special signals should not be in conflict with the standard signals.

4-3.4.4 Refueling

(a) When refueling with gasoline using a portable container, it shall be a safety-type can equipped with automatic closing cap and flame arrester.

(b) Machines shall not be refueled with the engine running.

(c) Smoking or open flames shall be prohibited in the refueling area.

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