PORT OF GUAM
ATURIDAT I PUETTON GUAHAN
Jose D. Leon Guerrero Commercial Port
1026 Cabras Highway, Suite 201, Piti, Guam 96915
Telephone: 671-477-5931/5 | Facsimile: 671-477-2689
Website: www.portofguam.com

Lourdes A. Leon Guerrero
Governor of Guam
Joshua F. Tenorio
Lieutenant Governor

POLICY MEMORANDUM NO. 2024-GM03

To: Equipment Maintenance and Repair	Subject: **Container Cranes: Safety Standard for Cableways, Cranes, Derricks, Hoist, Hooks, Jacks, and Slings**
Effective Date: October 1, 2024	Revision Date:
Approved by: **RORY J. RESPICIO, General Manager**	

1. INTRODUCTION.

A. This publication implements the Port Authority of Guam (PAG) directive advising on Ship to Shore Gantry Cranes (Container Cranes).

B. Policy Reference:
   a. American Society of Mechanical Engineers ASME B30.24-2018 (Reaffirmed 2023).
   b. Occupational Safety and Health Administration (OSHA) CFR 1910.179.

2. PURPOSE.

A. This Standard is intended to:
   a. Prevent or minimize injury to workers, and otherwise provide for the protection of life, limb, and property by prescribing safety requirements.
   b. Provide direction to manufacturers, owners, employers, users, and others concerned with, or responsible for, its application.
   c. Guide PAG in the development, promulgation, and enforcement of appropriate safety directives.

3. SCOPE.

A. The following provisions apply to the operation, inspection, testing, and maintenance of container cranes used for lifting purposes, in conjunction with equipment described in other volumes of the B30 Standard. This includes power-operated cranes of the above type whose power source is either self-contained or provided externally; single, double, or box girder construction, utilizing a trolley and a container-handling spreader or other applicable lifting apparatus (cargo hook, cargo beam, magnet, etc.); and rail- or rubber tire-mounted with through-the legs or between-the-legs operation. Use of the same hardware for purposes other than lifting is excluded from the provisions of this Volume. This policy does not apply to small industrial truck-type cranes, container-handling top loaders and side loaders, or mobile straddle-type industrial lifts.

B. This policy shall be the maintenance standard for PAG Container Cranes or Ship to Shore (STS) Gantries, to ensure the safety of personnel and the protection of cranes this shall be adhered to by all EQMR maintenance personnel unless conflicting with the manufacturer's recommendation. In all instances, the manufacturer's direction shall override this policy.

4. INSPECTION.

A. **General.** Inspections shall be performed by designated persons. Any deficiencies identified shall be examined and a determination made by a qualified person as to whether they constitute a hazard and if so, what additional steps need to be taken to address the hazard.

1. **Inspection Classification.**
   a. **Initial Inspection.** Before initial use, new, reinstalled, altered, modified, or repaired cranes shall be inspected to ensure compliance with the applicable provisions of this policy. The inspection shall be per the requirements of Section 4, Subparts (A)(1) & (2).
   b. Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The two general classifications are designated as frequent and periodic, with respective intervals between inspections as defined below.
      i. **Frequent Inspection.** Visual examinations at daily to monthly intervals with records not required.
      ii. **Periodic Inspection.** Visual inspection at 1-month to 12-month intervals or as specifically recommended by the manufacturer or qualified person. Records shall be kept of apparent external conditions to provide the basis for a continuing evaluation.

Note: If an elevator is fitted, its inspection protocol shall be conducted by the provisions of ASME A17.1.

2. **Frequent Inspection.** Frequent inspection shall include observations during operation. The following items shall be inspected:
   a. Operating mechanisms for proper operation, proper adjustment, and unusual sounds.
   b. Motion limit devices that interrupt power or cause a warning to be activated for proper performance. Each motion shall be inched or operated at low speed into the limit device with no load on the crane.
   c. Tanks, valves, pumps, lines, and other parts of air or hydraulic systems for leakage.
   d. Spreader and head block for proper condition.
   e. Rope for proper spooling onto the drum(s) and sheave(s).
   f. Operational aids for proper function by the recommendations of the device manufacturer or a qualified person.

3. **Periodic Inspection.**
   a. A qualified person shall determine whether disassembly is required.
   b. The inspection shall include the items listed in Section 4, Subpart (A)(1) and items and conditions such as the following:
      i. Deformed, cracked, or corroded members.
      ii. Loose or missing bolts, nuts, pins, or rivets.
      iii. Cracked or worn sheaves and drums.
      iv. Worn, cracked, or distorted parts, such as pins, bearings, wheels, shafts, gears, rollers, locking and clamping devices, bumpers, and stops.

v. Excessive wear of brake system parts.
vi. Excessive wear of chain drive sprockets and excessive chain stretch.
vii. Deterioration of controllers, master switches, contacts, limit switches, and push-button stations but not limited to these items.
viii. Wind indicators for proper operation.
ix. Gasoline, diesel, electric, or other power plants for proper operation.
x. Function labels for legibility and replacement.
xi. Damaged trolley rail joints at boom hinges.

5. TESTING.

A. Operational Test.

1. **New or Relocated Container Cranes.** Before initial use, new or relocated container cranes shall be tested by or under the direction of a qualified person. Testing shall include, but not be limited to, the following functions:
   a. Hoisting, lifting, and lowering.
   b. Trolley, full range of travel.
   c. Gantry travel.
   d. Boom, raise, and lower or shuttle.
   e. Over-hoist limit switches. The actuating mechanism of the limit device shall be located so it will trip the device under all conditions in sufficient time to prevent damage from two-blocking.
   f. Locking, limiting, and indicating devices, if provided.

2. **Repaired or Modified Container Cranes.** Before use, a repaired or modified container crane shall be tested. Testing may be limited to the function(s) affected by the repair or modification.

B. Load Test.

1. **New or Relocated Container Cranes.**
   a. Before initial use and following operational tests, new or relocated container cranes shall be inspected and load tested by or under the direction of a qualified person. A written test report shall be prepared by the qualified person and be placed on file where readily available. Test loads shall not be less than 120% nor more than 125% of the rated load unless otherwise recommended by the manufacturer or a qualified person.
   b. The load test shall consist of the following operations as a minimum requirement:
      i. Utilize Form PAG24-006 to document the load test according to steps below.
         1. Hoist the test load a short distance, and stop to verify that the load is supported by the crane and held by the hoist brakes.
         2. Measure the distance from the ground to the bottom of the load and document.
         3. Leave load suspended for a period no longer than 5 minutes.
         4. Measure from the same location; distance from the bottom of the load to the ground. Document findings.
            - If the load doesn't drop more than 1/4-inch proceed with testing.
            - If load drops more than 1/4-inch lower load and restart test from Section 5, Subpart B(1)(b)(i).

5. Raise the test load, and transport it by means of the trolley for the full length of trolley travel.
6. Transport the test load by means of the gantry travel for a short distance of the runway in each direction with the test load centered between the runway rails.
7. Lower the test load, and stop and hold the load with the brakes.
8. After testing Gantry should be inspected to determine if it has withstood the testing.
9. If defects are found or are unsafe the Gantry must be isolated immediately until the necessary repairs are done and retested.

2. **Repaired or Altered Container Cranes.** For any major repair or replacement of any Load Bearing, Load Controlling, or Operational Safety Device a load test will be conducted by a qualified person. Testing may be limited to the function(s) affected by the repair, alteration, or modification.

6. MAINTENANCE.

A. Operational Safety Devices will never be overridden unless approved and documented by EQMR Management.

B. **Preventive Maintenance.**

1. A preventive maintenance program shall be established and should be based on the recommendations outlined in the crane manufacturer's manual. Dated records should be kept and placed on file by Maintenance Control.

2. Replacement parts shall be at least equal to or greater than the original manufacturer's specifications.

C. **Maintenance Procedure.**

1. Before adjustments and repairs are started on a crane, the following precautions shall be taken as applicable:
   a. The crane to be repaired should be placed in a location where it will be safe from interference with other cranes and operations in the area.
   b. Controllers shall be placed in the "off" position.
   c. Electrical circuits being worked on shall be de-energized locked and tagged in the de-energized position.
   d. Effective markings and barriers shall be utilized in instances where repair/maintenance work creates a hazardous area beneath the crane.
   e. When cranes are in operation on the same runway, means shall be provided to avoid interference with the idle crane or work area.

2. Provisions shall be made for trained personnel to work on energized equipment when adjustments and tests are required.

3. After maintenance work is completed and before restoring the crane to normal operation.
   a. Guards shall be reinstalled.

b. Safety devices shall be reactivated.
c. Replaced parts and loose material shall be removed.
d. Maintenance equipment shall be removed.

D. **Adjustments and Repairs.**

1. Any hazardous conditions disclosed by the inspection requirements of Section 4, shall be corrected before normal operation of the crane is resumed. Adjustments and repairs shall be performed by designated personnel.

2. Adjustments shall be maintained to ensure the correct functioning of components. The following are examples:
   a. Functional Operating Mechanisms
   b. Limit devices
   c. Control systems
   d. Brakes
   e. If repairs of load-sustaining members are made by welding, identification of materials shall be made, and appropriate welding procedures shall be followed as recommended by the manufacturer or a qualified person.

E. **Lubrication.**

1. Moving parts of the crane for which lubrication is specified should be regularly lubricated. Lubricating systems should be checked for delivery of lubricant. Care should be taken to follow the manufacturer's recommendations as to points and frequency of lubrication, maintenance of lubricant levels, and types of lubricant to be used.

2. Machinery should be stationary while lubricants are being applied and protection provided as called for in Section 6, Subpart (C)(1), unless equipped for automatic or remote lubrication.

F. **Wire Rope Inspection and Replacement.**

1. General. Inspections shall be performed by designated persons. Any deficiencies identified shall be examined and a determination made by a qualified person as to whether they constitute a hazard, and if so, what additional steps need to be taken to address the hazard.

2. **Rope Inspection.**
   a. **Frequent Inspection.**
      i. Ropes should be visually inspected monthly. Visual observations should be concerned with discovering gross damage that may be a hazard, including the following:
         - Distortion of the rope, such as kinking, crushing, un-stranding, bird caging, main strand displacement, or core protrusion. Loss of rope diameter in a short rope length or unevenness of outer strands is evidence that the rope or ropes must be replaced.
         - General corrosion.
         - Broken or cut strands.

- Number, distribution, and type of visible broken wires [see Section 6, Subpart (F)(3)(a) and (b) for further guidance].

ii. Care shall be taken when inspecting sections subject to rapid deterioration, such as flange points, crossover points, and repetitive pickup points on drums.

iii. When damage is discovered, the rope shall either be removed from service or given an inspection as detailed in Section 6, Subpart (F)(2)(b).

- Records are not required for frequent inspections.

b. **Periodic Inspection.**

i. 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, the 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. This inspection shall be performed at least annually.

ii. Periodic inspections should cover the entire length of the rope. Only the surface wires need to be inspected. No attempt should be made to open the rope. Any deterioration resulting in appreciable loss of original strength, such as the conditions described below, shall be noted, and a determination shall be made by a qualified person as to whether further use of the rope would constitute a hazard.

- Points listed in Section 6, Subpart (F)(2).
- Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- Severely corroded or broken wires at end connections.
- Severely corroded, cracked, bent, worn, or improperly applied end connections.
  - Care shall be taken when inspecting sections subject to rapid deterioration, such as the following:
    - Sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited.
    - Sections of the rope at or near terminal ends where corroded or broken wires may protrude.
    - Sections subject to reverse bends.
    - Sections of rope that are normally hidden during visual inspection, such as parts passing over sheaves.
  - To establish data as a basis for judging the proper time for replacement, a dated report of rope condition at each periodic inspection shall be maintained.

3. **Rope Replacement.**

a. No precise rules can be given for the determination of the exact time for the replacement of rope since many variable factors are involved. Once 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 judgment of a qualified person.

b. Removal criteria for rope replacement shall be as follows:
   i. In running ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one lay.
   ii. One outer wire is broken at the point of contact with the core of the 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.
   iii. IWRC or strand core protrusion between the outer strands.
   iv. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure.
   v. Apparent damage from any heat source, including, but not limited to, welding, power-line strikes, or lightning.
   vi. Reductions from nominal diameter of more than 5%.
   vii. For 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.
   viii. Severe corrosion as evidenced by pitting.
   ix. Deviation shall be allowed from the removal criteria listed in Section 6, Subpart (F)(3)(b) only with the written approval of the manufacturer of the specific wire rope.

c. Broken wire removal criteria cited in this Volume apply to wire rope operating on steel sheaves and drums. The user shall contact the sheave, drum, or crane manufacturer, or a qualified person, for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

d. Replacement rope shall have the same or higher minimum breaking strength as the original rope furnished or recommended by the crane manufacturer. Any deviation from the original size, grade, or construction shall be specified by a rope manufacturer, the crane manufacturer, or a qualified person.

7. DEFINITIONS.

1. **Automatic crane:** a crane that, when activated, operates through a preset cycle or cycles.
2. **Boom:** an extension of the trolley runway on dockside container cranes that may be raised (luffing boom) or retracted (shuttle boom) to obtain clearance for gantry travel.
3. **Brake:** a device other than a motor used for retarding or stopping motion by friction or power means.
4. **Bumper (buffer):** a device for reducing the force of impact at the end of permitted travel.
5. Cab: a compartment with crane controls for the operator to control the operating functions of a container crane.
6. **Container crane:** a crane with single or multiple girders carrying a movable or fixed hoisting mechanism used primarily to lift intermodal shipping containers. It utilizes a trolley(s) and a container-handling spreader assembly.
7. **Controller:** a device or group of devices that serves to govern, in a predetermined manner, the power delivered directly to the apparatus to which it is connected.
8. **Crane:** a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine.
9. **Dockside container crane:** a rail-mounted cantilever gantry crane in which the trolley girder(s) extends transversely beyond the crane runway on one or both sides and is used

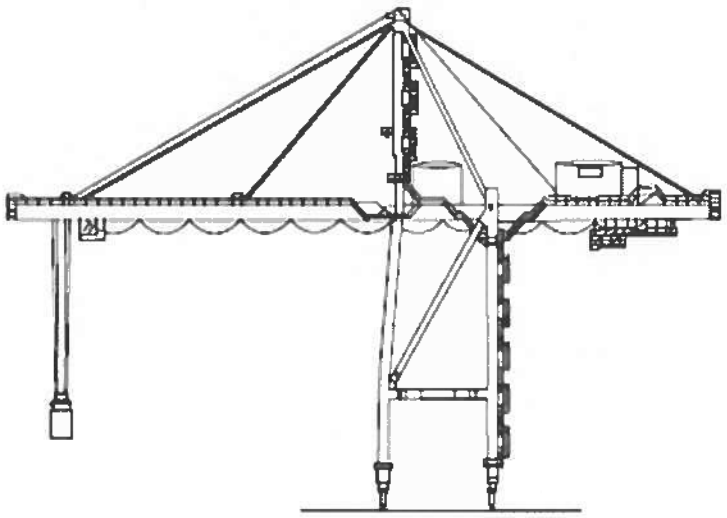
primarily to lift intermodal shipping containers on and off ships. The crane may have a luffing boom or a shuttle boom.

10. **Drum:** a cylindrical member around which wire rope is wound for moving the load, boom, or trolley.
11. **Emergency stop switch:** a manually actuated switch to disconnect power independently of the regular operating controls.
12. **Equalizer sheave:** a sheave used to equalize tension in opposite parts of the rope. Because of its slight movement, it is not termed a running sheave.
13. **Exposed:** applies to hazardous objects not guarded or isolated and capable of being contacted inadvertently.
14. **Gantry frame:** a structural assembly that supports the trolley girder beams.
15. **Gantry travel:** the crane movement in a direction parallel to the crane runway.
16. **Head block:** an assembly of sheaves, pins, and frame suspended from the crane for connecting container handling devices, such as lift beams and spreaders.
17. **Hoist:** a machinery unit that is used for lifting or lowering a freely suspended load.
18. **Holding brake:** a friction brake for a hoist that is automatically applied and prevents motion when power to the brake is off.
19. **Lifting apparatus:** spreaders, cargo beams, heavy lift beams, cargo hooks, and other devices attached to the head block for lifting loads.
20. **Limit device (crane motion):** a device that limits crane motion or takes control of particular functions without action of the operator when a limiting condition is reached.
21. **Limit switch:** a device that is actuated by the motion of a part of a power-driven machine or equipment to alter or disconnect the electric, hydraulic, or pneumatic circuit associated with the machine or equipment.
22. **Load:** the total superimposed weight on the spreader or hook.
23. **Main hoist:** the primary hoist mechanism provided for lifting and lowering the rated load.
24. **Master switch:** a switch that controls the operation of contactors, relays, or other remotely operated devices.
25. **Minimum breaking force:** the minimum load at which a new and unused wire rope will break when loaded to destruction in direct tension.
26. **Normal operating conditions:** conditions under which a crane is performing functions within the scope of the original design.
27. **Operational aid:** an accessory that provides information to facilitate the operation of a crane or that takes control of particular functions without action of the operator when a limiting condition is reached. Examples of such devices are hoist, trolley, and boom hoist limit switches.
28. **Original language(s):** used by the manufacturer to develop product instructions and manual(s).
29. **Parts of line:** the number of ropes supporting the load.
30. **Qualified person:** a person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
31. **Rail-mounted yard container crane:** a crane consisting of overhead girders supporting a trolley, mounted on rigid legs, and running on rails (see Figure 24-0.2-1).

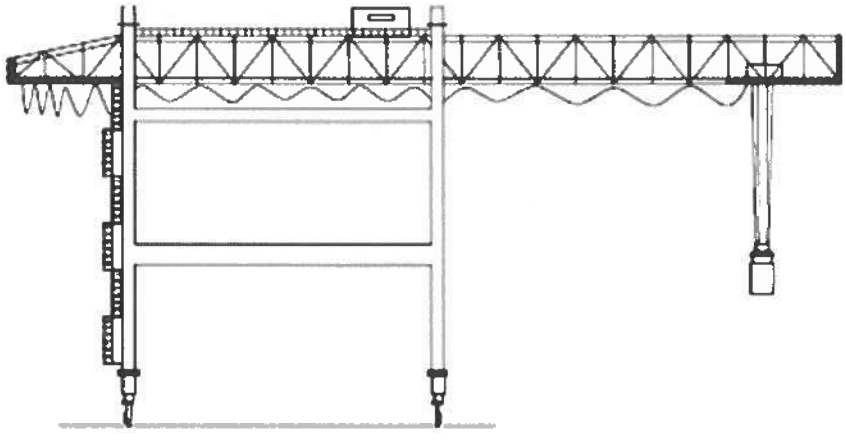
32. **Rail sweep:** a device attached to the crane and located in front of the crane's leading wheels to remove obstructions.
33. **Rated load:** the maximum allowable working load designated by the manufacturer for which a crane or individual hoist is designed and built. The term "safe working load" is commonly used to describe the rated load.
34. **Reeving:** a system in which a rope travels around drums and/or sheaves.
35. **Rope:** refers to wire rope unless otherwise specified.
36. **Rubber-tired yard container crane:** a crane consisting of overhead girders supporting a trolley, mounted on rigid legs, and running on rubber tires (see Figure 24- 0.2-1).
37. **Runway:** the path on which the gantry travels.
38. **Service crane:** an overhead crane, jib crane, monorail, or similar crane mounted in the machinery enclosure or other location on a container crane and used for servicing the container crane.
39. **Service platform:** a means provided for workers to perform maintenance, inspection, adjustment, or repair of cranes.
40. **Shall:** a word indicating a requirement.
41. **Sheave:** a grooved wheel or pulley used with a rope to change direction and point of application of a pulling force.
42. **Shock load:** any condition that causes a momentary increase in the forces in a load-supporting component beyond the weight of the actual load being lifted.
43. **Should:** a word indicating a recommendation.
44. **Side pull:** the portion of the hoist pull acting horizontally when the hoist lines are not tensioned vertically.
45. **Slap block:** a sacrificial protective device or guard to protect the wire rope or other parts of the crane from rope contact.
46. **Span:** the horizontal distance, center to center, between runway rails or tire centers.
47. **Spreader:** a fixed or telescoping frame attached to the head block that is used for lifting containers.
48. **Spring return controller:** a controller that, when released, will return automatically to a neutral (off) position.
49. **Stop a device to limit the travel of a trolley or gantry.** This device normally is attached to a fixed structure and normally does not have energy-absorbing ability.
50. **Switch:** a device for making, breaking, or changing the connections in an electric, hydraulic, or pneumatic circuit. torque proving: a feature that ensures sufficient motor torque is applied to the motor shaft before the release of the brake(s) and the start of drive operation.
51. **Trolley:** the unit that travels on the trolley rails and supports the load and lifting apparatus.
52. **Truck:** an assembly that includes a pivot, frame, axle(s), and wheels on which a crane rides on rails.
53. **Twist-lock:** a latching device whose rotatable motion locks or unlocks the spreader to an intermodal shipping container.

ASME B30.24-2018

Figure 24-0.2-1 Dockside Container Crane



(a) Luffing Boom Type



(b) Shuttle Boom Type