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Guidance on Practice for Inspection and Maintenance of Pedestal Cranes / Equipment

GP 38-21

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GP 38-21. This Guidance on Practice (GP) is based on parts of heritage documents from the merged BP companies as follows:

BP

RP 38-3

Inspection and Maintenance of Offshore Pedestal Cranes

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Page 2 of 43

Table of Contents

	Page
Foreword	2
1. Scope	5
2. Normative references	5
3. Terms and definitions	5
4. Symbols and abbreviations	12
5. Inspection classifications	13
5.1. Initial inspection	13
5.2. Frequent inspections	13
5.3. Periodic inspections	13
5.4. Annual inspection	13
5.5. Idle crane inspections	13
6. Non-destructive testing (NDT)	13
7. Deficiencies	14
8. Record keeping	14
9. Training	14
10. Rope	15
11. Drums	17
12. Band / shoe brake and clutch	18
13. Winch brakes	19
14. Slew lock	19
15. Hook and block	19
16. Primary load path	20
16.1. General	20
16.2. Slew-ring bearing and fasteners	20
16.3. Pedestal adapter	21
16.4. Boom & "A" frame	21
16.5. Machinery bed structure	22
17. Diesel driver	22
18. Pneumatic system	24
19. Power transmission	25
20. Hydraulic system	26
21. Machinery housing	27
22. Drivers compartment	27
23. Working / walking surfaces	28



24.	Safety devices	28
24.2.	Safe load indicator	29
24.3.	Gross over-moment protection system (GOP)	29
24.4.	Emergency load release	31
24.5.	Boom-out inhibit	31
24.6.	Over-hoist limit	32
24.7.	Over-lower limit	32
24.8.	Radius cut-out limit.....	33
24.9.	Emergency stop	34
24.10.	Engine overspeed shutdown.....	35
24.11.	Slack rope preventers	35
24.12.	Slew limits.....	36
24.13.	Pendulum radius indicator	36
24.14.	Wave following	37
24.15.	Rope temperature sensor	37
25.	Wind speed and direction indicator	38
26.	Fire and gas system	38
27.	Electrical	38
27.1.	Cables, fixtures, cabinets and components.....	38
27.2.	Electric motors.....	39
28.	Boom cages	40
29.	Ancillary lifting equipment.....	40
30.	Overloads.....	40
31.	Load testing	42



1. Scope

This GP provides guidance on practice for inspection and maintenance of pedestal cranes.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

American Petroleum Institute (API)

API 2C Specification for Offshore Pedestal Mounted Cranes

American Welding Society (AWS)

AWS D1.1 Structural Welding Code - Steel.

BP Engineering Technical Practices (ETPs)

GP 12-25 Earthing / Grounding

Engineering Equipment and Material Users Association (EEMUA)

Crane Inspections

International Organization for Standardization (ISO)

ISO 4309 Crane Wire Rope Inspection, Maintenance, Discard, and Installation.

Occupational Safety and Health Administration (OSHA)

1910 Subpart D Working / Walking Surfaces

3. Terms and definitions

For the purpose of this GP the following terms and definitions apply:

allowable rope load:

The “nominal” breaking strength of the rope divided by a design factor.

axis of rotation:

The vertical axis around which the crane upper-structure rotates.

bearing raceway:

The surface of the bearing rings which contact the rolling element (balls or rollers) of the swing-bearing assembly.

bearing ring:

The rotating and stationary rings that house the rolling elements (balls or rollers) of the swing-bearing assembly.



boom:

Member hinged to the revolving upper structure and used for supporting the hoist tackle.

boom angle:

The angle above or below horizontal of the longitudinal axis of the base boom section.

boom angle indicator:

An accessory which measures the angle of the boom above horizontal.

boom chord:

A main corner member of a lattice type boom.

boom extension:

Intermediate section of a telescoping boom.

boom foot-pin:

The boom pivot point on the upper-structure.

boom hoist:

The hoist mechanism responsible for raising and lowering the boom.

boom hoist mechanism:

Means for supporting the boom and controlling the boom angle.

boom hoist wire rope:

Wire rope that operates on a drum controlling the angle positioning of the boom.

boom lacing:

Structural truss members at angles to and supporting the boom chords of a lattice type boom.

boom length:

The straight-line distance from the centreline of boom foot-pin to the centreline of the boom-point load hoist sheave pin, measured along the longitudinal axis of the boom.

boom lift-cylinder:

Means for supporting the boom and controlling the boom angle.

boom line:

Boom hoist rope that reels on drums or passes over sheaves.

boom-point sheave assembly:

An assembly of sheaves and a pin built as an integral part of the boom-point.

boom splices:

Splicing connections for sections of basic crane boom and additional sections usually of the splice plate type, pin type, or butt type.

boom stop:

A device used to limit the angle of the boom at the highest recommended position.

brake:

A device used for retarding or stopping motion or holding.



cab:

An enclosure for the operator and the machine operation controls.

clutch:

A means for engagement or disengagement of power.

counterweight:

Weight used to supplement the weight of the machine in providing stability for lifting working loads and usually attached to the rear of the revolving upper-structure.

critical component:

Any component of the crane assembly devoid of redundancy and / or auxiliary restraining devices whose failure would result in an uncontrolled descent of the load or uncontrolled rotation of the upper-structure.

Cv:

Vertical design coefficient that is multiplied by the Safe Working Load (SWL) to provide the vertical design load.

designated:

Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

design load:

The vertical design load is equal to the SWL times the vertical design coefficient Cv. Other loads considered in design of the crane include offload, side-load, environmental loads, loads due to crane base motion, and other loads as defined herein.

design requirements:

The requirements set forth by the manufacturer's engineering authority for materials, manufacturing, fabrication, and inspection procedures to be employed in the production of the crane.

dynamic loading:

Loads introduced into the machine or its components due to accelerating or decelerating loads.

enclosure:

A structure that may provide environmental protection for the machine.

fitness-for-purpose:

The manufacture or fabrication of an assembly or component to the quality level required (but not necessarily the highest level attainable) to assure material properties, environmental interactions, and any imperfections present in the assembly or connection are compatible with the intended purpose. Fitness-for-purpose connotes an assembly or component may contain material or fabrication imperfections of sizeable dimensions but their presence has no influence on its performance or reliability.

fixed platform:

A bottom supported, stationary structure without significant movement in response to waves and currents in operating conditions. Examples are fixed platforms with jacket and pile supports, jack-up rigs, and submersible bottom-supported rigs.



floating harness (also known as bridle):

A frame equipped with sheaves and connected to the boom by stationary ropes usually called pendants.

floating platform / vessel:

A moving structure that the crane is mounted on.

foundation bolts or fasteners:

The bolts used to connect a swing bearing to the upper-structure and / or pedestal.

fracture control plan:

The consideration of material properties, environmental exposure conditions, potential material and fabrication imperfections, and methods of inspection for the purpose of eliminating conditions which could result in failure under the design requirements for the projected life of the crane.

gantry (also known as A-frame or mast):

A structural frame, extending above the upper-structure to which the boom support ropes are reeved.

guy rope:

A non-operating, standing wire rope that maintains a constant distance between the points of attachment to the components connected by the wire rope.

hoisting:

The process of lifting.

hoist mechanism:

A hoist drum and rope reeving system used for lifting and lowering loads.

hoist rope:

Wire rope involved in the process of lifting.

hoist tackle:

Assembly of ropes and sheaves arranged for pulling.

hook block:

Block with a hook attached used in lifting service. It may have a single sheave for double or triple line or multiple sheaves for four or more parts of line.

hook rollers:

Rollers that prevent the lifting of the revolving upper-structure from the roller path. Hook rollers are a means to connect the upper-structure to the foundation or pedestal.

Hsig:

The sea significant wave height existing that is associated with the load chart, rating, or other condition herein.

in service:

A crane is in service when the operator is in control of the crane.

jib (also known as tip extension):

An extension attached to the boom point to provide added boom length for lifting specified loads.



king-pin:

Vertical pin or shaft that acts as a rotation- centering device and connects the revolving upper-structure and base mounting.

king post:

A tubular member that acts as the centreline of rotation and as the connective member to the platform.

lattice boom:

Boom of open construction with lacing between main corner members (chords) in form of a truss.

load block-lower:

The assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by the hoisting ropes.

load block-upper:

The assembly of shackle, swivel, sheaves, pins, and frame suspended from the boom point.

load line (also known as hoist line):

In lifting crane service it refers to the main hoist rope. The secondary hoist ropes referred to as a whip line or auxiliary line.

load ratings:

Crane ratings in pounds (kilograms) established by the manufacturer.

loose gear:

Includes all slings, nets, hooks, baskets, shackles, chains, ropes, cables, life vests, etc., necessary in crane operations to attach the load to the crane hook or block and to move the load. Life jackets and life vests are terms for a Coast Guard approved life saving device able to support an unconscious person in the face-up position. Work vests are buoyant flotation devices, usually made of plastic and foam. Work vests are not approved for work over water or for personnel transfer.

luffing:

The operation of changing boom angle in a vertical plane.

major structural revision:

A change to the structure that reduces the load-carrying capability of any structural component or for which a revised load chart has been established.

mast (also known as gantry):

A frame hinged at or near the boom hinge for use in connection with supporting a boom. The head of the mast is usually supported and raised or lowered by the boom hoist ropes.

off board lift:

A crane lifting a load from or to anywhere not on the platform / vessel that the crane is mounted on (from / to supply boats, for example).

onboard lift:

A crane lifting a load from and to the deck of the platform / vessel that the crane is mounted on.

operator's station:

The designated location for the operator to operate the machine.



out-of-service:

A crane is out-of-service when the operator is not controlling the crane. Out-of-service conditions may be with the boom out of the boom rest or in the boom rest (stowed).

overhaul:

Ability of a weight on the end of the hoist line to unwind rope from the drum when the brake is released.

overhaul ball:

The weight on a single part line used to pull the wire rope off the drum with gravitational assistance.

pawl (dog):

A device for positively holding a member against motion in one or more directions.

pedestal (also known as base):

The supporting substructure upon which the revolving upper-structure is mounted.

pendant line (also known as guy rope):

A non-operating standing rope of specified length with fixed end connections.

pitch diameter:

Root diameter of drum, lagging or sheave, plus the diameter of the rope.

power controlled lowering:

A system or device in the power train, other than the load hoist brake, that can control the lowering speed of the load hoist mechanism.

prototype:

An initial manufactured component or unit of a specific design adhering to API Spec 2C.

qualified:

A person who, by possession of a recognized degree, 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.

rated capacity:

The rated load or SWL at specified radii as established by the manufacturer which are the maximum loads at those radii covered by the manufacturer's warranty for the conditions specified.

reeving:

A rope system where the rope travels around drums and sheaves.

revolving upper-structure:

The rotating upper frame structure and the operating machinery mounted thereon (also known as turntable).

roller path:

The surface upon which the rollers that support the revolving upper-structure bear. It may accommodate cone rollers, cylindrical rollers, or live rollers.

rolling element:

The balls or rollers contained between the rings of the swing-circle bearing.



rotating base:

See revolving upper-structure.

rope:

Refers to wire rope unless otherwise specified.

rotation-resistant rope:

A wire rope consisting of an inner layer of strand laid in one direction covered by a layer of strand laid in the opposite direction. This has the effect of counteracting torque by reducing the tendency of the finished rope to rotate.

running rope:

A rope which travels around sheaves or drums.

Safe Working Load (SWL):

The maximum rated load within crane rated capacity for the given operating conditions.

side load:

A load applied at an angle to the vertical plane of the boom.

sling:

An assembly that connects the load to the material handling equipment.

spline:

Any of a series of projections on a shaft that fit into slots on a corresponding shaft, enabling both to rotate together.

standing (guy) wire rope:

A supporting, non-operating wire rope that maintains a constant distance between the points of attachment to the two components connected by the wire rope.

structural competence:

The ability of the machine and its components to withstand the stresses imposed by applied loads.

swing (slewing):

Rotation of the upper-structure for movement of loads in a horizontal direction about the axis of rotation.

swing bearing:

A combination of rings with balls or rollers capable of sustaining radial, axial, and moment loads of the revolving upper-structure with boom and load.

swing circle:

See swing bearing and roller path. The swing-circle assembly is the connecting component between the crane revolving upper structure and the pedestal for cranes of types A, B, C, and D. It allows crane rotation and sustains the moment, axial, and radial loads imposed by crane operation.

swing gear (also known as ring gear or bull gear):

External or internal gear with which the swing pinion on the revolving upper-structure meshes to provide swing motion.



swing mechanism:

The machinery involved in providing dual directional rotation of the revolving upper structure.

swivel:

A load-carrying member with thrust bearings that permit rotation under load in a plane perpendicular to the direction of the load.

tail swing (rear end radius):

Clearance distance from the centre of rotation to the maximum rear extension of the revolving upper-structure.

telescoping boom:

Consists of a base boom from which one or more boom sections are telescoped for additional length.

torque converter:

Auxiliary transmission connected to the prime mover that multiplies engine torque as load increases with a corresponding decrease in speed.

two-blocking:

The condition when the lower load block or hook assembly contacts the upper load block or boom-point sheave assembly.

whip line:

A secondary rope system, usually of lighter load capacity than provided by the main rope system. Also known as auxiliary.

wire rope:

A flexible, multi-wired member usually consisting of a core member around which a number of multi-wired strands are "laid" or helically wound.

working load:

The external load in pounds (kilograms), applied to the crane including the weight of load attaching equipment such as load block, shackles, and slings. The maximum allowable working load for a given condition would be the SWL.

4. Symbols and abbreviations

For the purposes of this GP the following symbols and abbreviations apply:

GOP	Gross Over-moment Protection
ID	Inside Diameter
NDT	Non-Destructive Testing
OD	Outside Diameter
SLI	Safe Load Indicator
UPS	Un-interruptible Power Supply



5. Inspection classifications

5.1. Initial inspection

Prior to first time use, new cranes shall be inspected by a qualified inspector to levels of compliance required by the crane manufacturer.

5.2. Frequent inspections

Frequent inspections should be carried out daily or weekly based on a routine schedule and conducted prior to operation. Inspections should focus on items such as the following:

- a. Fluid Levels
- b. Greasing
- c. Hoist rope and mechanisms
- d. Instruments

5.3. Periodic inspections

For cranes in regular service, inspections are dependant upon the nature of the cranes components or systems and of the degree of their exposure to wear, deterioration or malfunction and of the consequences to operational safety. Examples of periodic inspections typically range from a frequency of 1 to 6 month intervals.

5.4. Annual inspection

Each crane shall be inspected fully every 12 months by a qualified inspector, whereby all remedial work will be identified and cleared prior to issue of an inspection certificate. Annual inspection shall include regular inspection schedules.

5.5. Idle crane inspections

- a. Cranes which have been idle for a period of one month up to six months shall be inspected according to the periodic requirements in this document.
- b. Cranes which have been idle for a period of 6 months shall be given a complete annual inspection according to the requirements in this document.

6. Non-destructive testing (NDT)

- a. NDT examination of weldments referred to in this GP shall be in accordance with recognised inspection and acceptance standards such as AWS D1.1.
- b. The extent of examination is as follows:
 1. All welds shall be visually inspected.
 2. All fillet welds to be subjected to 100% Magnetic Particle Inspection.
 3. On Primary load carrying structures, all butt welds shall be 100% inspected by radiography or ultrasonic examination. In areas where joint configuration or material thickness precludes radiographic / ultrasonic examination, alternative methods shall be sought from the crane manufacturer or from an approved inspection body.
 4. Tee butt welds to be 100% ultrasonically examined.
 5. All butt welds on Primary load carrying structures to be also subjected to 100% Magnetic Particle Inspection.

