

CHAPTER 22.0 PAGINATION TABLE

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DEFINITIONS AND ACRONYMS

The following specialized terms and acronyms are used regarding hoisting and rigging operations and equipment. Not all of these terms are used in this manual but have been included for general information.

AC--Alternating current.

acceleration stress--Additional stress imposed by an increase in the load velocity.

ACI--American Concrete Institute.

administrative or regulatory authority--Governmental agency, or the employer in the absence of governmental jurisdiction.

aggregate strength--The wire rope strength derived by totaling the individual breaking strengths of the elements of the strand or rope. This strength does not recognize the reduction in strength resulting from the angularity of the elements in the rope or from other factors that may affect efficiency.

AGMA--American Gear Manufacturers Association.

AISC--American Institute of Steel Construction.

AISE--Association of Iron and Steel Engineers.

AISI--American Iron and Steel Institute.

albert's lay--Synonymous with **lang lay**.

alternate lay--Lay of wire rope in which the strands are alternately regular lay and lang lay.

alternator/generator (eddy current brake)--When used in conjunction with an eddy current brake, it provides stator excitation in the event of simultaneous loss of power and mechanical brake failure. Provides for a safe lowering of a suspended load after power failure.

angle indicator, boom--An accessory that measures the angle of the boom base section to the horizontal.

angle of loading--Inclination of a leg or branch of a sling as measured from the horizontal or vertical plane.

annual condition report--An annual report of the current condition of a crane. This report is prepared by a qualified person using maintenance and inspection records from the crane history file to compare the current condition with the original condition and the condition reported in previous years. Operation and performance histories are compared with original performance specifications and actual performance as reported in previous years to identify trends or equipment degradation.

ANS--American Nuclear Society.

ANSI--American National Standards Institute.

anti-two-block device--A device which, when activated, disengages all crane functions whose movement can cause two-blocking. See **two-block damage prevention feature** and **two-block warning feature**.

API--American Petroleum Institute.

appointed person--Person assigned specific responsibilities for an activity.

armored rope--See **steel clad rope**.

ASLE--American Society of Lubrication Engineers.

ASM--American Society of Metals.

ASME--American Society of Mechanical Engineers.

ASNT--American Society for Nondestructive Testing.

ASTM--American Society for Testing Materials.

attachment, forklift truck--A device other than conventional forks or load backrest extension, mounted permanently or removable on the elevating mechanism of a forklift truck for handling the load. Popular types are fork extensions, clamps, rotating devices, side shifters, load stabilizers, rams, and booms.

authorized--Approved by a duly constituted administrator or regulatory authority.

authorized service center--An independent service facility designated by the manufacturer to repair and test equipment of their manufacture.

auxiliary hoist--Supplemental hoisting unit usually smaller and faster than the main hoist.

AWG--American Wire Gage.

AWS--American Welding Society.

axis of rotation--The vertical axis around which the crane superstructure rotates. Also called center of rotation (obsolete) and swing axis.

back-hitch gantry--A fixed- or adjustable-height structure that forms part of the upper structure of a mobile crane, to which the lower spreader (carrying live boom-suspension ropes) is anchored.

back stay--Guy used to support a boom or mast or that section of a main rope, as on a suspension bridge or cableway leading from the tower to the anchorage.

bail--(a) The U-shaped member of a bucket or load usually used as a lifting point; or (b) A U-shaped portion of a socket, or other fitting used on wire rope.

ballast--Weight added to a crane base to create additional stability; it does not rotate when the crane swings.

barrel--The lagging or body part of a rope drum in a drum hoist.

base--The mounting flanges or feet used to attach a hoist to its supporting structure or foundation.

base mounting--The structure forming the lowest element of a crane or derrick; it transmits loads to the ground or other supporting surface. For mobile cranes, this is synonymous with carrier or crawler mounting. For tower cranes, the term includes a travel base, knee frame base, or fixed base (footing).

base section--The lowermost section of a telescopic boom; it does not telescope but contains the boom foot pin mountings and the boom-hoist-cylinder upper end mountings.

basic boom--The minimum length of sectional latticed boom that can be mounted and operated, usually consisting of a boom base and tip section only.

basket of socket--The conical portion of a socket into which a splayed rope end is inserted and secured with zinc.

bearing life (rated life)--The number of revolutions or the number of hours at a constant speed that 90 percent of an apparently identical group of bearings will complete or exceed before the first evidence of fatigue develops; i.e., 10 out of 100 bearings will fail before rated life. **Minimum life** and **L10 life** are also used to mean rated life.

becket line--That part of the rope in a multi-ply reeving system that is dead-ended on one of the blocks.

becket loop--A loop of small rope or strand fastened to the end of a large wire rope to facilitate installation.

bird cage--A colloquial term describing the appearance of wire rope forced into compression. The outer strands form a "cage" and, at times, displace the core.

bleeding line--A condition caused when wire rope is overloaded, forcing the lubricant in the cable to be squeezed out and run excessively.

block--A term applied to a wire rope sheave (pulley) enclosed inside plates and fitted with some attachment such as a hook or shackle.

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

boom (crane)--A member, in compression, hinged to the rotating superstructure and used for supporting the hoisting tackle and load.

boom base--The lowermost section of a sectional latticed boom having the attachment or boom foot pins mounted at its lower end; also called boom butt or butt section.

boom foot mast--A component of some mobile-crane boom suspensions. It consists of a frame hinged at or near the boom foot to increase the height of the inboard end of the fixed-boom suspension ropes, thereby increasing the angle the suspension ropes make with the boom while being itself controlled by the boom-hoist ropes. Its purpose is to reduce the axial compressive force on the boom; also called hi-light gantry.

boom guy line--A fixed-length rope forming part of the boom-suspension system; also called hog line, **boom stay**, **standing line**, or **stay rope**.

boom head--The portion of a boom that houses the upper load sheaves.

boom hoist--The rope drum(s), drive(s), and reeving controlling the luffing motion of the boom.

boom-hoist cylinder--Hydraulic ram used instead of a rope boom suspension, the most common means of derricking telescopic booms.

boom hoist line--Wire rope that operates the boom hoist system of equipment such as derricks, cranes, deadlines, and shovels.

boom inserts--Center sections of a sectional latticed boom usually having all four chords parallel.

boom line--A wire rope for supporting or operating the boom on equipment such as derricks, cranes, draglines, and shovels.

boom pendant--A nonoperating rope or strand with end terminations to support the boom.

boom stay--A fixed-length rope forming part of the boom-suspension system; also called **boom guy line**, hog line, **standing line**, or **stay rope**.

boom stop--A device intended to limit the maximum angle to which the boom can be raised.

boom tip section--The uppermost section of a sectional latticed boom, which usually includes the weldment mounting the upper load sheaves as an integral part; also called boom point, head section, or **tapered tip**.

boom suspension--A system of rope fittings, either fixed or variable in length, that supports the boom and controls the boom angle.

brake--A device used for retarding or stopping motion by friction or power means.

brake, drag--A brake that provides retarding force without external control.

brake, eddy current--A device for controlling load speed in the hoisting or lowering direction by placing a supplementary load on the motor. This loading results from the interaction of magnetic fields produced by an adjustable or variable direct current in the stator coils and induced currents in the rotor.

brake, holding or parking--A brake that automatically sets and prevents motion when power is off.

brake, mechanical load--A friction device, usually using multiple discs or shoes, for controlling load speed in the lowering direction only. The brake prevents the load from overhauling the motor.

braking, counter torque--See **counter torque**.

breaking strength--The measured tensile load required to cause failure of cable, chain, wire rope, or any other load-bearing element.

bridge crane--See **cranes, types of**.

bridge travel--Horizontal travel of the crane parallel with bridge runway rails.

bridge trucks--An assembly consisting of wheels, bearings, axles, and structural framework that supports the end reactions of the bridge girders.

bridle sling--Sling composed of multiple wire rope legs with a fitting that attaches to the lifting hook.

bright rope--Wire rope made of wires that are not coated with zinc or tin.

brooming--Unlaying and straightening of strands and wires in the end of wire ropes during the process of installing a wire rope socket.

bull pole--A pole, generally of steel pipe, which is mounted to project laterally from the base of a derrick mast. It is used to swing the derrick manually.

bull ring--The main, large ring of a sling to which sling legs are attached; also called **master link**.

bull wheel--A horizontally mounted circular frame fixed to the base of a derrick mast to receive and guide the ropes used for swinging.

bumper (buffer)--An energy-absorbing device that reduces impact when two moving cranes or trolleys come into contact or when a moving crane or trolley reaches the end of its permitted travel.

butt section--The lowermost section of a sectional latticed boom having the attachment or boom foot pins mounted at its lower end; also called boom butt.

cab--Operator's compartment on a crane.

cab, normal--Operator's compartment from which a crane is controlled.

cab, skeleton--Operator's compartment used for occasional cab operation of a normally floor- or remote-operated crane.

cable--A term loosely applied to wire ropes, wire strand, and electrical conductors. **Wire rope** is the preferred term for hoisting and rigging application.

cable crowd rope--Wire rope used to force the bucket of a power shovel into the material being handled.

cable-laid wire rope--A wire rope consisting of several independent wire ropes wrapped around a fiber or wire rope core.

cableway--Aerial conveying system for transporting single loads along a suspended track cable.

cab-operated crane--See **cranes, types of**.

camber--The slight curvature given to beams and girders to compensate for deflections caused by loading.

canyon--A descriptive term applied to some building configurations at the Hanford Site, usually process plants, which have an operating floor or level, surrounded by high walls. A typical canyon building is much longer than it is wide.

canyon crane--A term used on the Hanford Site to describe a crane, usually an overhead or gantry crane, that is installed above the operating floor in a canyon building. Such cranes typically will have a lift range that extends below the operating floor to piping and equipment located in cells or pits below the operating floor.

capstan--A spool-shaped revolving drum, manually or power-operated, used for pulling fiber or synthetic rope. Also called a **winch head**.

carrier (trolley)--A unit that travels on the bottom flange of a monorail track or a bridge girder to transport a load.

CCTV--Closed circuit television.

CDL--Commercial Driver's License.

CFR--Code of Federal Regulations.

cheek plate(s)--The stationary plate that support(s) the pin (axle) of a sheave or load.

cheek weights--Overhauling weights attached to the side plates of a lower load block.

choker--Sling, wire rope with eyes spliced on each end, which is used to lift load.

choker hitch--Sling with one end passing under the load and through a loop end attachment on other end of sling.

class (of load)--See **critical service** and **critical lift**.

clearance--The horizontal or vertical distance from any part of the crane to a point of the nearest obstruction.

clevis--A U-shaped fitting with holes in each end through which a pin or bolt is run.

clip--Fitting for clamping two parts of wire rope.

closed cell--For the purposes of this manual, access to closed cells is limited during some operating cycles. See **hot cell**.

closed socket--Wire rope end fitting consisting of integral basket and bail.

closing line--Wire rope that closes a clamshell or orange-peel bucket, and then operates as a hoisting rope.

clutch--An electromagnetic, hydraulic, pneumatic, or positive mechanical device for engagement or disengagement of power.

CMAA--Crane Manufacturers Association of America.

CMV--Commercial Motor Vehicle.

coil--Circular bundle of wire or fiber rope not packed on a reel.

collector--Contacting device mounted on bridge or trolley for collecting current from conductor system.

come-along--Lever-operated chain or wire rope devices designed for pulling, not lifting; also called **pullers**. Unlike hoists, the tension is held by a releasable ratchet. Much smaller and lighter than hoists of equal capacity, they are not intended nor allowed for lifting, but are suited for activities such as skidding machinery.

commercial motor vehicle--A motor vehicle or combination of motor vehicles used in commerce to transport passengers or property if the motor vehicle

- a. has a gross combination weight of 11,794 kg (26,001 lb) or more inclusive of a towed unit with a gross vehicle weight rating of more than 4536 kg (10,000 lb), or
- b. has a gross vehicle weight rating of 11,794 kg (26,001 lb) or more, or
- c. is designed to transport 16 or more passengers, including the driver, or
- d. is of any size and is used in the transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act and which requires the motor vehicle to be placarded under 49 CFR 172, Subpart F, "Hazardous Materials Regulations."

conductors (bridge or runway)--Electrical conductors located along the bridge girder(s) or runway to provide power and/or control circuits to the crane and trolley.

conical drum--Grooved hoisting drum of tapering diameter.

continuous bend--Reeving of wire rope over sheaves and drums so that it bends in one direction, as opposed to reverse bend.

control braking means--A method of controlling hoisting or lowering speed of the load by removing energy from the moving load or by imparting energy in the opposite direction.

controller--A device or group of devices that serve to govern, in some predetermined manner, the power delivered to the motor to which it is connected.

controller, spring return--A controller which, when released, will return automatically to a neutral position.

control panel--An assembly of magnetic or static electrical components that govern the flow of power to or from a motor in response to signals from a master switch, push-button station, or remote control.

core--Core member of wire rope about which the strands are laid. It may be fiber, a wire strand, or an independent wire rope.

corrosion--Chemical decomposition by exposure to moisture, acids, alkalis, or other destructive agents.

corrugated--A term used to describe the grooves of a sheave or drum when worn so as to show the impression of a wire rope.

counter jib--A horizontal member of a tower crane on which the counterweights and usually the hoisting machinery are mounted; also called **counterweight jib**.

counter torque--A method of control by which the power to the motor is reversed to develop torque in the opposite direction to the rotation of the motor. See **braking, counter torque**.

counterweight jib--Also called **counter jib**.

counterweights--Weights added to a crane upper structure to create additional stability. They rotate with the crane as it swings.

cover plate--The top or bottom plate of a box girder or junction box.

crane--A machine for lifting and lowering a load vertically and moving it horizontally with the hoisting mechanism as an integral part of the machine. The term is applicable to fixed and mobile machines and to powered or manually driven machines.

crane classification--The CMAA has established six service classes to enable the purchaser to specify the most economical class of crane for a particular installation. It is not economical either to under specify or to over specify when choosing a service class. Specifying a crane with too light a service class will reduce cost but may result in excessive maintenance. A crane with too high a service class may decrease maintenance costs but at an excessive initial investment. See **crane service**.

crane service--Class A (Standby or Infrequent Service)

Class A1 (Standby Service)--This service class covers cranes used in installations such as power houses, public utilities, turbine rooms, nuclear reactor buildings, motor rooms, nuclear fuel handling and transformer stations, where precise handling of valuable machinery at slow speeds with long idle periods between lifts is required.

Class A2 (Infrequent Use)--These cranes are used in installations such as small maintenance shops, pump rooms, testing laboratories, and similar operations where the loads are relatively light, speeds are slow, and a low degree of control accuracy is required. The loads may vary anywhere from no load to full rated load with a frequency of a few lifts per day or month.

crane service--Class B (Light Service)—This service covers cranes that may be used in repair shops, light assembly operations, service buildings, or light warehousing, where service requirements are light, and the speed is slow. Loads may vary from no load to occasional full rated loads with two to five lifts per hour, averaging 3 meters (10 feet) per lift.

crane service—Class C (Moderate Service)—This service covers cranes that may be used in machine shops or paper-mill machine rooms, where service requirements are moderate. In this type of service, the crane will handle loads that average 50 percent of the rated capacity with 5 to 10 lifts per hour, averaging 4.6 meters (15 feet), not over 50 percent of the lifts at rated capacity.

crane service--Class D (Heavy Service)--This service covers cranes that may be used in heavy machine shops, foundries, fabricating plants, steel warehouses, container yards, or lumber mills, and standard-duty bucket and magnet operations where heavy-duty production is required.

In this type of service, loads approaching 50 percent of the rated capacity will be handled constantly during the working period. High speeds are desirable for this type of service with 10 to 20 lifts per hour averaging 4.6 meters (15 feet), not over 65 percent of the lifts at rated capacity.

crane service—Class E (Severe Service)—This type of service requires a crane capable of handling loads approaching a rated capacity throughout its life. Applications may include magnet, bucket, magnet/bucket combination cranes for scrap yards, cement mills, lumber mills, fertilizer plant, or container handling, with 20 or more lifts per hour at or near the rated capacity.

crane service--Class F (Continuous Severe Service)--This type of service requires a crane capable of handling loads approaching rated capacity continuously under severe service conditions throughout its life. Applications may include custom-design specialty cranes essential to performing the critical work tasks affecting the total production facility. These cranes must provide the highest reliability with special attention to ease of maintenance features.

cranes, types of--

automatic crane--A crane that, when activated, operates through a preset cycle or cycles.

bridge crane--A crane with a single- or multiple-girder movable bridge, carrying a movable trolley or fixed hoisting mechanism, and traveling on an overhead fixed runway structure.

cab-operated crane--A crane controlled by an operator in a cab located on the bridge or trolley.

cantilever gantry crane--A gantry or semigantry crane in which the bridge girders or trusses extend transversely beyond the crane runway on one or both sides.

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

Its function is to hoist, lower, and swing loads at various radii.

double-girder crane--A crane having two bridge girders mounted between, and supported from, the end trucks.

floating crane--A rotating superstructure, power plant, operating machinery, and boom mounted on a barge or pontoon. The power plant may be installed below decks. The crane's function is to handle loads at various radii.

floor-operated crane--A power-operated crane that is controlled by an operator from the floor or an independent platform or walkway located in the crane-way, using power control switches or push-buttons on a pendant.

gantry crane--A crane similar to an overhead bridge crane, except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway, usually 3 meters (10 feet) or more below the bottom of the bridge.

hammerhead tower crane--A lifting machine consisting of a mast with an upper, rotating member to which a jib boom is attached that extends horizontally from the rotating member, with a counter-weighted jib boom extending from the rotating member in the opposite direction, neither of which jib booms are arranged or rigged for luffing. The main jib boom carries a trolley on which the lower load block is suspended. The counterweight jib boom contains the counterweight for the main jib and working load, and sometimes provides the mounting for the hoisting and trolley travel motors and drums.

interlocking crane--A crane with an interlock mechanism on one or both ends, enabling it to be mechanically locked to another crane, fixed transfer section, or spur track for the purpose of transferring a carrier from one to another.

jib crane--A fixed crane with a vertical rotating member supported at the bottom (also at the top in some types), from which an arm extends to carry the hoist trolley. Jib cranes are most commonly mounted on a vertical column, supplied as part of the jib crane or mounted on existing structural members (e.g., a wall-mounted jib crane).

locomotive crane--A crane consisting of a rotating superstructure with power plant, operating machinery and boom, mounted on a base or car equipped for travel on a railroad track. It may be self-propelled or propelled by an outside source. Its function is to hoist and swing loads at various radii.

manually operated crane--A crane whose hoist mechanism is driven by pulling an endless chain, or whose travel mechanism is driven in the same manner or by manually moving the load.

monorail crane--A crane or hoist attached to a trolley that runs on the flanges of a structural beam.

overhead crane--A crane with a single or multiple girder movable bridge, carrying a movable trolley or fixed hoisting mechanism, and traveling on an overhead fixed runway structure.

polar crane--A bridge or gantry crane that travels on a circular runway.

power-operated crane--A crane whose mechanism is driven by electricity, air, hydraulic, or internal combustion engine, as opposed to hand-operated movements.

pulpit-operated crane--A crane operated from a fixed operator station not attached to the crane.

remotely operated crane--A crane controlled by any method other than with a pendant, rope, or attached cab.

semi-gantry crane--A gantry crane with one end of the bridge rigidly supported by leg(s) that run on a fixed rail or runway and the other end supported by end trucks that run on an elevated rail or runway.

single-girder crane--A crane having one bridge girder mounted between, and supported from the end trucks.

storage gantry crane--A gantry-type crane of long span usually used for bulk storage of material. The bridge girders or trusses are rigidly or nonrigidly supported on one or more legs. It may have one or more fixed or hinged cantilever ends.

truck crane--A crane consisting of a rotating superstructure with a power plant, operating machinery, and boom on a truck-type mounting equipped with a power plant for travel. Its function is to hoist, lower, and swing loads at various radii. Some variations of this use a single engine in the truck that also is the power source for the superstructure, or use a single engine in the superstructure, which is also the power source for the truck.

wall-mounted jib--See **cranes, types of, jib crane**.

wall crane--A crane having a jib, with or without a trolley, supported from a side wall or line of columns of a building. It is a traveling-type crane and operates on a runway attached to the side wall or line of columns.

wheel-mounted crane (wagon crane)--A crane consisting of a rotating superstructure with power plant, operating machinery and boom, mounted on a base or platform equipped with axles and rubber-tired wheels for travel. The base may be propelled by an engine in the superstructure, or with a separate engine controlled from the superstructure. Its function is to hoist, lower, and swing loads at various radii.

craneway--The area in length and width served by a crane.

crawler frames--Part of the base mounting of a crawler crane attached to the car body and supporting the crawler treads, the track rollers, and the idler sprockets. Crawler frames transmit crane weight and operational loadings to the ground; also called **side frames**.

creep speed--A very slow, constant, continuous, fixed rate of motion of the hoist, trolley, or bridge, usually established at 1 to 10 percent of the normal full-load speed.

critical diameter--Diameter of the smallest bend for a given wire rope that permits the wires and strands to adjust themselves by relative movement while remaining in normal position.

critical lift--A hoisting operation in which a critical item will be hoisted or moved, or in which a noncritical item will be hoisted or moved in an area where critical items could be affected.

critical load or item--In accordance with this manual: A part, component, assembly, or piece of equipment ("item") whose dropping, upset, or collision could cause/result in the following:

- a. Damage that would result in serious economic consequences
- b. Damage that would result in unacceptable delay to schedule or other significant deleterious programmatic impact (such as loss of vital data)
- c. Undetectable damage that would jeopardize future operations or safety of a facility
- d. Significant release of radioactive or other hazardous material to the environment or create an undesirable condition
- e. Personnel injury or significant adverse health impact, either onsite or offsite.

Large, costly items should be considered critical. Items that require special care in handling because of size, weight, installation in close-tolerance receptors, fragility, high susceptibility to damage or other unusual factors should be considered critical.

Implicit in this definition is the possibility of handling items, which are themselves not critical in nature, over other items that are critical, thus making the lift involved "critical."

critical load--In accordance with ANSI N14.6: Any lifted load whose uncontrolled movement or release could adversely affect any safety-related system when such system is required for unit safety or could result in potential off-site exposures comparable to the guideline exposures outlined in Code of Federal Regulations, Title 10, Part 100.

critical load--In accordance with ASME NOG-1: Any lifted load whose uncontrolled movement or release could adversely affect any safety-related system when such system is required for unit safety or could result in potential off-site exposures in excess of the limit determined by the equipment purchaser.

critical service--The use of equipment or tackle for hoisting, rigging, or handling of critical items, or other items in, around, or above spaces containing critical items.

crossover points--In multiple-layer spooling of rope on a drum, those points of rope contact where the rope crosses the preceding rope layer.

CSAO--Construction Safety Association of Ontario.

custodian--An individual designated as having custodial responsibility for equipment. The custodian takes "ownership" of assigned equipment and ensures that required maintenance, inspections, and tests remain current. The custodian will have quick access to the equipment history file.

cylindrical drum--Hoisting drum of uniform diameter.

DC--Direct current.

D/d RATIO--A term regarding wire rope. D = Diameter of curvature around which the rope is bent. d = diameter of rope. Example: With 0.5-inch-diameter rope passing over a 20-inch-diameter sheave, the D/d ratio is 40. The D/d ratio is a key factor in load-carrying ability and life span of a wire rope.

dead end--The point of fastening of one rope end in a running rope system, the other end being fastened at the rope drum.

dead-line--The end of the rotary drilling line fastened to the anchor or dead-line clamp.

deadman--An object or structure, either existing or built for the purpose, used as anchorage for a guy rope.

deceleration stress--Additional stress imposed on rigging resulting from a decrease in load velocity.

deflection--(a) The sag across a span of a load member caused by the imposed live and/or dead loads, which is usually measured at mid-span as the distance along a straight horizontal line drawn between the supports; (b) any deviation from a straight horizontal line.

derrick--An apparatus for lifting or lowering loads, consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with hoists and ropes.

design factor--The conservatism used in design calculations. As a function of design, this factor can be based upon the point of equipment failure, such as crane tipping, and brake stopping capacity, or based upon strength of materials, ultimate, nominal, or yield. Consensus standards and this manual express design factors as a ratio (for example: 5:1, 3:1, 3.5:1) or as a single number (for example: 5, 3, or 3.5, understood to mean the "X" to 1). Although "design factor" is sometimes referred to as a "safety factor", "design factor" is the preferred term. An inexperienced person may incorrectly assume this factor of design conservatism will make up for such conditions as shock loading, poor rigging, improper equipment selection, and overload conditions.

designated--Selected or assigned by the employer or employer's representative as being qualified to perform specific duties. See **appointed person**.

designated leader (DL)--A qualified individual assigned to all hoisting and rigging operations to ensure that the lifting operation is properly performed.

diameter (wire rope)--The diameter of wire rope is the diameter of the circle that will contain the rope.

direct geared--A hoist with drum(s) geared directly to its power source.

DOE--U.S. Department of Energy.

Dog leg--Permanent short bend or kink in wire rope caused by improper use.

DOL--U.S. Department of Labor.

DOT--U.S. Department of Transportation.

dragline--Wire rope used to pull an excavating or drag bucket. Also used as an expression of a particular type of mobile crane using a drag bucket during excavation.

drifting--Pulling a suspended load laterally to change its horizontal position.

drift point--A point on a travel motion controller that releases the brake while the motor is not energized. This allows for coasting before the brake is set.

drive--An assembly consisting of motors, couplings, gear, and gear case(s) that is used to propel a bridge, trolley, or hoist.

drive girder--Girder on which the bridge drive, cross shaft, walk, railing, and operator's cab are mounted.

drum--(a) A cylindrical-flanged barrel of uniform (cylindrical drum) or tapering (conical drum) diameter on which cable is wound for operation or storage, which may be smooth or grooved; (b) the cylindrical member around which rope is wound for lifting or lowering the load or boom, or swinging the boom supporting structure.

drum capacity, rope--The length of a specific diameter of rope that can be wound on a drum.

drum hoist--A hoisting mechanism incorporating one or more rope drums; also called **hoist**, winch, or hoisting engine.

dummy cab--See cab, skeleton.

dynamic loading--Loads introduced into the machine or its components by forces in motion.

dynamic lowering--A method of control by which the hoist motor is so connected in the lowering direction, that when it is over-hauled by the load, it acts as a generator and forces current through resistors. (NOTE: Feeding back into the line is regenerative braking.)

efficiency (wire rope)--Ratio of a wire rope's measured breaking strength and the aggregate strength of all individual wires tested separately, which is usually expressed as a percentage. The breaking strength of wire ropes seldom exceeds 90 percent of the aggregate strength of all the wires, the average being about 82.5 percent.

elastic limit--Limit of stress above which a permanent deformation takes place within the material. This limit is approximately 55 to 65 percent of breaking strength of steel wire ropes.

end control--The operator-control position is located at the end opposite the load end of the truck.

end penetration--The treatment of the end of a length of wire rope designed primarily as an aid for pulling the rope through a reeving system or tight drum opening. These are not designed for use as a method for making a permanent connection.

end termination--The treatment at the end or ends of a length of wire rope, which is usually made by forming an eye or attaching a fitting, designed to be the permanent end termination on the wire rope that connects it to the load.

end tie--A structural member, other than the end truck, that connects the ends of the girders to maintain the squareness of the bridge.

end truck--An assembly consisting of structural members such as wheels, bearings, and axles that supports the bridge girder(s) or the trolley cross member(s).

endless rope--Rope whose two ends are spliced together.

equalizer--Device used to compensate for unequal length or stretch of a hoist rope and connects two or more systems to a single running block.

equalizing thimble--Special type of fitting used as a component part of some wire rope slings.

equalizing sheave--The sheave at the center of a rope system over which no rope movement occurs other than equalizing movement. It is frequently overlooked during crane inspections, with disastrous consequences. It can be a source of severe degradation.

examination-- The process of nondestructive testing performed to ensure freedom from harmful hidden defects that could result in catastrophic failure.

exposed--Applies to hazardous objects not guarded or isolated (capable of being contacted inadvertently).

extender--A device that increases a jack's closed length.

extraflexible wire rope--See **extrapliable wire rope**.

extraimproved plow steel rope--See **grades, rope**.

extrapliable wire rope (also called extraflexible)--Wire rope made with either 8 strands of 19 wires each, or 6 strands of 37 wires each, with a fiber core. The wires in this rope are smaller than those used in standard rope and consequently are not as suitable to withstand abrasion.

eye or eye splice--A loop with or without a thimble formed in the end of a wire rope.

factor of safety--See **design factor**.

fail-safe--A provision designed to automatically stop or safely control any motion in which a malfunction occurs.

falls--See **parts of line**.

fatigue--The phenomenon leading to fracture under repeated or fluctuating stresses having a maximum value less than the tensile strength of the material.

fiber cores--Cords or rope made of vegetable or synthetic fiber used in the core of a wire rope.

fiddle block--A block consisting of two sheaves in the same plane held in place by the same cheek plates.

filler wire--Small auxiliary wires in a strand used for spacing and positioning other wires.

fitting--Any accessory used as an attachment for wire rope.

flange point--A point of contact between rope and drum flange where the rope changes layers.

flat rope--Wire rope made of parallel alternating right-lay and left-lay ropes sewn together by relatively soft wire.

flattened strand rope--A wire rope of either oval or triangular shaped strands that presents a flattened rope surface.

fleet angle--The maximum angle between a rope and the line perpendicular to the drum on which it winds.

fleeting sheave--Sheave mounted on a shaft parallel to the rope-drum shaft and arranged so that it can slide laterally as the rope spools, permitting close sheave placement without excessive fleet angle.

flemish eye--A type or method of making a wire rope eye splice. Same as a "Molly Hogan."

floating crane--See **cranes, types of**.

floor-operated crane--See **cranes, types of**.

FO&M--Fleet Operations and Maintenance.

footblock--A steel weldment or assembly serving as the base mounting for a guy derrick, gin pole, or boom derrick.

foot-walk--A walkway with handrail and toeboards, attached to the bridge or trolley for access purposes.

forklift truck--A high-lift, self-loading truck, equipped with load carriage and forks for transporting and tiering loads.

FRAM--**Functions, Responsibilities, and Authority Manual**

front-end attachment--see **attachment, fork-lift truck**

gage points--Permanent marks on a hook that are used to determine any change in the throat-opening dimension.

galvanized rope--Wire rope made of galvanized wire.

galvanized strand--Strand made of galvanized wire.

gantry crane--See **cranes, types of**.

generator--See **alternator/generator**.

girder, bridge--The principal horizontal beam(s) of the crane, which supports the trolley, is supported by the end trucks, and is perpendicular to the runway.

girder, drive (Girder “A”)--The bridge girder to which the bridge motor and gear-case(s) are attached. For cranes having a drive on each girder, it is the girder to which the control panels and/or the cab are attached.

girder, idler (Girder “B”)--The bridge that does not have the bridge drive attached, but usually carries the bridge conductors.

girder, runway--A horizontal beam attached to the building columns or wall and supporting a runway rail on which the crane travels.

girder, auxiliary (outrigger)--An additional girder, either solid or latticed, arranged parallel to the bridge girder(s) for supporting the footwalk, control panels, or operator’s cab to reduce the torsional forces such loads might otherwise impose.

gooseneck boom--A boom with an upper section projecting at an angle to the longitudinal centerline of the lower section.

grades, rope--Classification of wire rope by its breaking strength. Listed in order of increasing breaking strengths: iron, traction, mild plow steel, plow steel, improved plow steel, and extra-improved plow steel.

grooved drum--Drum with a grooved surface that accommodates and guides the rope.

grooves--Depressions in the periphery of a sheave or drum used for positioning and supporting a rope.

gudgeon pin--The pin at the top of a derrick mast forming pivot for the spider or for the mast of a stiff-leg derrick.

guy or guy line--Strand or rope, usually galvanized steel, for holding a structure in position.

hammerhead boom--A boom tip arrangement in which both the boom suspension and the hoist ropes are greatly offset from the boom longitudinal centerline to provide increased load clearance.

HAMTC--Hanford Metal Trades Council.

handling fixture--A cradle, handling structure, shipping fixture, or container designed specifically to support or facilitate component lifting or handling during fabrication, loading, shipping, storage, installation, or use.

haulage rope--Wire rope used for pulling cars on a track.

hazardous (classified) location--Locations where fire or explosion hazards may exist. Locations are classified depending on the properties of the flammable vapors, liquids, or gases, or combustible dusts or fibers which may be present and the likelihood that a flammable or combustible concentration or quantity is present.

Class I--Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Class II--Locations that are hazardous because of the presence of combustible dust.

Class III--Locations where easily ignitable fibers or flyings are present but not likely to be suspended in quantities sufficient to produce ignitable mixtures.

H&R--Hoisting and rigging.

high consequence--See **critical item**, **critical lift**, and **critical service**.

HHRC--Hanford Hoisting and Rigging Committee.

HMI--Hoist Manufacturers Institute.

hoist--Noun: (a) A lifting device for raising or lowering loads. Its service area is vertical over its mounting. Hoists may be attached to fixed or moveable structures by an upper hook or bracket and can be either power or manually operated; (b) A power-operated component of a crane or monorail system that provides torque to raise a load or lower it at a controlled speed and hold a load stationary; (c) A power-driven drum or drums capable of lifting and lowering loads.

Verb: The action of raising a load.

hoist, direct geared--A hoist with a drum(s) geared directly to its power source.

hoist, drum--A hoist with hoisting drum(s) and with or without a swinger.

hoist, friction drum--A hoist with drum(s) controlled by friction clutches and brakes and provided with drum ratchets and pawls.

hoist, lever-operated--A lever-operated, manual device used to lift, lower, or pull a load and to apply or release tension. (See **come-along**.)

holding line--Wire rope on a clamshell or orange-peel bucket that holds the bucket while the closing line is released to dump the load.

hook, rigging--A hook used as part of tackle. Any hook used in hoisting and rigging that is not the "primary hook" or main "load hook."

hook latch--A mechanical device to bridge the throat opening of a hook.

hot cell--A shielded enclosure where the shielding media is composed of concrete, steel, lead or other special materials, specifically designed to protect operating personnel from undue amounts of nuclear radiation. For the purpose of this manual, access to hot cells is minimal or very rarely allowed and most work functions are performed remotely.

HR--Human resources.

idler--Sheave or roller used to guide or support a rope. It is also used as a slang expression for an **equaling sheave**.

improved plow steel rope--See **grades, rope**.

inching--See **jog**.

inching drive (micro drive)--A mode of crane operation (usually limited to hoists) that disengages the main drive motor by means of a clutch mechanism and engages a single, nonvariable motor drive at a very low or creep speed.

independent wire rope core (IWRC)--Wire rope used as the core of a larger rope.

internally lubricated--Wire rope or strand in which all wires are coated with lubricant.

iron rope--See **grades, rope**.

ISO--International Standards Organization.

jack--A portable hand- or power-operated mechanism with a base and load point designed for controlled linear movement.

jack, double-acting hydraulic--A jack that is extended and retracted under hydraulic pressure.

jack, mechanical--A jack using any means other than fluid to move the load.

jib--An extension attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles in the vertical plane of the boom.

jib crane--See **cranes, types of**.

jog (inch)--To move the hook, trolley, or bridge in a series of short, discontinuous increments by momentary operation of a controller.

kink--Permanent distortion of wires and strands resulting from sharp bends.

L10 life--See **bearing life**.

laced blocks--Passing wire rope through a set of blocks by starting from an outside sheave and following in rotation. Will usually tilt travel block when running empty.

lagging--External wood covering on a reel to protect the wire rope, strand, or grooved drum.

lang lay rope--Wire rope in which the wires in the strands and the strands in the rope are laid in same direction. Synonymous with **albert's lay**.

latch, hook--A device used to bridge the throat opening of a hook.

latticed boom--A boom constructed of four longitudinal corner members, called chords, assembled with transverse and/or diagonal members, called lacings, to form a trusswork in two directions. The chords carry the axial boom forces and bending moments, while lacings resist the shears.

lay (wire rope)--(a) The manner in which the wires in a strand or the strands in a rope are helically laid, or (b) the distance measured parallel to the axis of the rope (or strand) in which a strand (or wire) makes one complete helical convolution about the core (or center). In this connection, lay is also referred to as "lay length" or "pitch".

lead line--That part of a rope tackle leading from the first or fast sheave to the drum.

lefthand end--A reference to parts or dimensions on the viewer's left of the centerline of span, established when facing the drive girder side of the crane.

left lay--(a) strand--strand in which cover wires are laid in a helical pitch, similar to left-hand screw; (b) rope--rope in which strands are laid in a helix having a left-hand pitch, similar to left-hand screw.

level luffing--An operating technique whereby the crane or derrick hook does not significantly change elevation as the boom is raised or lowered.

lift--(a) Any sequence of operations in which a hoisting device raises an object above the ground, floor, or support, and then places it on the ground, floor, or support; (b) maximum safe vertical distance through which the hook can travel; (c) the hoisting of a load.

lift, critical--See **critical lift**.

lift, ordinary--Any lift not designated as a critical lift.

lift beam--See **spreader beam**.

lifting devices--Devices that are not reeved onto the hoist ropes, such as hook-on buckets, magnets, grabs, load-spreader bars, and other supplemental units used for ease of handling certain types of loads. The weight of these devices is to be considered part of the working load.

lifting eye--A point of attachment on the item to be lifted, having a looped head designed to accommodate a hook or shackle. Also called a **slinging eye**.

limiting devices--A device that is operated by some part of a power-driven machine or equipment to control motions of the machine or equipment.

limit switch--An electrical device that is operated by the bridge, trolley, or hoist motion to disconnect the circuit, to establish a new circuit, or to provide a warning.

line--Rope used for supporting and controlling a suspended load.

line pull--The pulling force attainable in a rope leading off a rope drum or lagging at a particular pitch diameter (number of layers).

line speed--The speed attainable in a rope leading off a rope drum or lagging at a particular pitch diameter (number of layers).

load--The total superimposed weight or force to be overcome by the hoisting and rigging equipment.

load-bearing parts--Any part of a material-handling device in which the induced stress is influenced by the hook load. A primary load-bearing part is one, where the failure of which could result in dropping, upset, or uncontrolled motion of the load. Load-bearing parts which, if failed, would result in no more than stoppage of the equipment without causing dropping, upset, or loss of control of the load, are not considered to be primary load-bearing parts.

load block, lower--The assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by hoisting ropes.

load block, upper--The assembly of sheaves, pins, and frame suspended from the hoisting platform or from the boom in mobile cranes.

load center (forklifts)--The horizontal longitudinal distance from the intersection of the horizontal load-carrying surfaces and vertical load engaging faces of the forks (or equivalent load positioning structure) to the center of gravity of the load.

load, critical--See **critical load**.

load, dead--The load(s) on a portion of the crane, which remain(s) in a fixed position relative to the member being considered.

load float--A control system that enables stepless operation of a hoist in either the lifting or lowering direction for a range of about 0 percent to 5 percent of full-rated speed, as well as permitting the load to be suspended stationary for a very short time with the holding brake(s) released.

load jib--The horizontal live load supporting member of a hammerhead-type tower crane having the load falls supported from a trolley that traverses the jib; also called **saddle jib**.

load, live--A load that moves or varies relative to the member being considered. For the trolley, the live load consists of the rated load plus the weight of the block. For the bridge, the live load consists of the rated load plus the weight of the trolley.

load point--The point of load application.

load point, auxiliary--Any point of load application other than the load point.

load point, integral auxiliary--Any nonremovable point of load application other than the load point.

load rating, auxiliary--Rated load of the jack, as determined by the manufacturer, when load is applied at the auxiliary load point.

load radius--Normally, the horizontal distance from the axis of rotation to the center of gravity of a lifted load. In mobile crane practice, this is more specifically defined as the horizontal distance from the projection to the ground of the axis of rotation before loading to the center of a loaded but vertical hoist line.

load, rated--The maximum static vertical load for which a crane or an individual hoist is designed. See **rated capacity**.

load rating--Rating in pounds established by the manufacturer.

load, safe working (SWL)--The maximum load a piece of equipment (or tackle) can handle without exceeding the rated capacity (the rated capacity of the lowest capacity item used in the lift). See **load, rated**.

load, working--The external load, in pounds applied to the crane. For mobile cranes and derricks, the weight of load-attaching equipment is included as part of the working load (e.g., load blocks, hooks, shackles, and slings). In permanently installed cranes such as overhead, gantry, and monorail cranes and hoists, the weight of the load block and hook is not part of the working load.

locked coil strand--Smooth-surfaced strand composed of shaped wires laid in concentric layers around a center of round wires.

lowest service temperature (LST)--A predetermined temperature below which all lifting equipment, assemblies, or fixtures should not be used.

luffing--Changing the boom angle. Also called **booming in (out)**, or **topping**.

machine resisting moment--The moment of the deadweight of the crane or derrick, less boom weight, about the tipping fulcrum; hence, the moment that resists overturning; also called **machine moment** or **stabilizing moment**.

magnet--An electromagnetic device carried on a crane hook that picks up loads magnetically.

magnetic controls--Controls in which acceleration and deceleration are controlled as a master switch or pushbutton is moved from neutral to the forward or reverse positions. A combination of electromagnetically operated contractors and relays that actuate sequentially to vary the motor torque by changing the resistance.

magnetic particle examination--A nondestructive test that reveals defects in ferromagnetic materials via detection of leakage fields at discontinuities in magnetic flow paths.

main hoist--The hoist mechanism provided for lifting the machine's maximum-rated load.

main switch--A switch controlling the entire power supply to the hoist.

man trolley--A trolley having an operator's cab attached.

marlin spike--Tapered steel pin used in splicing wire rope.

mast--The upright member of a derrick.

mast cap--See **spider**.

master link--Forged or welded steel link used to support all members (legs) of an alloy-steel chain or wire rope sling (includes bull ring, pear link, oblong link, and weldless sling link). Also called bull-ring.

master switch--A manual or automatic device that governs the operation of contractors and/or auxiliary devices of an electric control and provides for shutdown of all electric power to a crane or hoist.

material elevator--A mechanism consisting of a tower with vertical members, which guide a platform that is lifted and lowered by means of a hoist.

MHI--Material Handling Institute.

micro drive--See **inching drive**.

mild plow--See **grades, rope**.

milking--The progressive movement of strands along the axis of the rope, resulting from the ropes movement through a restricted passage such as a tight sheave.

minimum life--See **bearing life**.

Molly Hagan--A type or method of making a wire rope eye splice. Same as a "flemish eye".

monorail--Usually a series of continuous beams with curves, switches, and stops that carry loads over a predetermined route or routes.

monthly. Once each calendar month. A maintenance/inspection program should accomplish monthly tasks at approximately the same time each calendar month. To manage such programs, tasks should be scheduled as "due" on a particular date. If a task cannot reasonably be performed on the scheduled "due" date, it should promptly be rescheduled for a date during the same calendar month.

mousing--A method of bridging the throat opening of a hook to prevent the release of load lines and slings, under service or slack conditions, by wrapping with soft wire, rope, heavy tape, or similar materials.

narrow-aisle truck--A self-loading truck primarily intended for right-angle stacking in aisles narrower than those normally required by counterbalance trucks of the same capacity.

NCR--Nonconformance report.

NDA--Nondestructive assessment.

NDT--Nondestructive test.

NEMA--National Electrical Manufacturers Association.

NFPA--National Fire Protection Association.

nil-ductility transition temperature--The maximum temperature at which a standard drop-weight specimen breaks when tested in accordance with ASTM E-208.

NLGI--National Lubricating Grease Institute.

NLGI Grade number--A grade number defining the consistency of grease in accordance with methods prescribed by the National Lubricating Grease Institute.

nominal strength, wire rope--Nominal wire rope strengths as calculated by a standardized industry-accepted procedure. Minimum acceptance strength is 2½% lower than nominal strength. (Re: Wire Rope Users Manual.)

nondestructive examination (NDE)--A name applied to a variety of tests which make use of indirect means to locate material discontinuities (e.g., radiography, dye penetrant, magnetic particle, ultrasonic).

nonrotating wire rope--See **rotation-resistant rope**.

nonspinning wire rope--See **rotation-resistant rope**.

normal operating conditions--Those conditions during which a crane or carrier is being operated and is performing functions within the scope of the original design. For a cab-operated crane, the operator is at the operating control devices in the cab and no other person is on the crane. For a floor-operated crane or carrier, the operator is at the operating control devices, which are suspended from the crane but operated with the operator off the crane, and no person is on the crane. For a remote-operated crane or carrier, the operator is at the operator control devices, which are not attached to any part of the crane, and no person is on the crane.

NRC--U.S. Nuclear Regulatory Commission.

offset angle--The angle between the longitudinal centerline of a jib and the longitudinal centerline of the boom on which it is mounted.

OJT--On-the-job training.

open socket--Wire rope fitting consisting of a basket and two ears with a pin.

operating sectors--Portions of a horizontal circle about the axis of rotation of a mobile crane providing the limits of zones where over-the-side, over-the-rear, and over-the-front ratings are applicable.

OSHA--Occupational Safety and Health Administration (or Act).

outriggers--Extendable arms attached to a crane base mounting, which include the means for relieving the wheels (crawlers) of crane weight; used to increase stability.

overhauling weight--Weight added to a load fall to overcome resistance and permit unspooling at the rope drum when no live load is being supported; also called **headache ball, cheek weights**.

overhead crane--See **cranes, types of**.

overhead guard--A framework fitted to a truck over the head of a riding operator.

overload--Any load in excess of the safe working load or rated capacity of the equipment or tackle.

overtravel--Movement beyond maximum travel for which the jack was designed.

overturning moment--The moment of the load plus the boom weight about the tipping fulcrum. Wind and dynamic effects can be included when appropriate.

parking brake--A device to prevent the movement of a stationary vehicle.

parts of line--A number of running ropes supporting a load or force, also called parts or **falls**.

pawl (dog)--A device for positively holding a member against motion in one or more directions.

paying out--Adding slack to a line or relieving load on a line by letting (spooling) out rope.

PCSA--Power Crane and Shovel Association.

pendant, boom--A fixed-length rope forming part of the boom-suspension system; also called **boom guy line, boom stay, hog line, standing line, or stay rope**.

pendant control station--Controls suspended from an overhead crane, gantry crane, or overhead hoist for operating the unit. (Commonly called the pendant.)

peening--Permanent distortion of outside wire in a rope caused by pounding.

periodic inspection--Daily to yearly inspections.

pitch diameter--The distance, measured through the center of a drum or sheave, from center to center of a rope passed about the periphery of the drum or sheave.

pivoted luffing jib--A tower crane jib that in general has pivot points somewhere in the middle area; also called **articulated jib**.

plow steel--See **grades, rope**.

plug--To operate a controller in such a manner that the motor line voltage polarity or phase sequence is reversed before the motor rotation has stopped, thereby developing a counter torque that acts as a retarding force.

plugging--Stopping the forward motion of the bridge or trolley travel by reversing the controller to the opposite direction.

plugging relay--A current relay that senses current in the motor secondary circuit of an alternating current motor and limits reverse torque of the motor until the motor rotation has stopped. In a direct current control panel, the relay performs the same function by establishing a sensing circuit at the motor armature (also known as the antiplugging relay.)

polar crane--See **cranes, types of**.

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

powered industrial truck--A mobile, power-driven vehicle used to carry, push, pull, lift, stack, or tier material.

power-operated crane--See **cranes, types of**.

pre-engineered lift--A noncritical lift that management has designated as requiring additional controls by having a qualified individual or engineer independently pre-identify load weight, load center of gravity, lift attachment points, and minimum lifting hardware (slings, below-the-hook lifting devices, shackles, etc.) capacities that will be used for the lift or series of lifts. Pre-identified information shall be provided to the personnel involved in the lift.

prece test--A recognized standard of testing the galvanized coating on wire.

preformed strand--Strand in which the wires are permanently shaped, before fabrication in the strands, to the helical form they assume in the strand.

preformed wire rope--Wire rope in which the strands are permanently shaped, before fabrication into the rope, to the helical form they assume in the wire rope.

pressure gripping lifters, friction type--Lifters that grip the load without significant or harmful permanent deformation of the load surfaces.

pressure gripping lifters, indentation type--Lifters that carry the load by applying sufficient force to permanently indent the sides of the load.

prestressing--Stressing a wire rope or strand before use under such a tension and for such a time that the construction stretch is largely removed.

preventive maintenance--A periodic or scheduled program that provides lubrication, adjustments, inspection, and testing as required to keep equipment in safe, operable working conditions.

primary load-bearing part--See **load-bearing parts**.

proof load--The load applied in performance of a proof test.

pullers--Also called **come-along**.

pulpit-operated crane--See **cranes, types of**.

qualified--A person, who by possession of a recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. The cognizant manager shall have the right of review (including right to approve or reject) all qualifications.

qualified engineer--A person who, by possession of a recognized degree or 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. The cognizant manager shall have the right of review (including right to approve or reject) all qualifications.

qualified inspector--One whose competence is recognized by the cognizant manager and whose qualification to perform specific inspection activities has been determined verified and attested to in writing.

qualified operator--One whose competence to operate equipment safely and effectively (including the ability to accurately spot and control loads) has been demonstrated by extensive experience or operational tests and whose name has been posted on the Qualification List in the work area by the cognizant manager.

qualified rigger--One whose competence in this skill has been demonstrated by experience satisfactory to the appointed person. See **rigging specialist**.

qualified safety representative--A person who, by possession of a recognized degree or 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.

qualified welder--A person holding a certificate as proof that qualified test welds have been performed and passed in accordance with the governing welding code.

rail, bridge--The track supported by the bridge girder(s) on which the trolley travels.

rail, runway--The track supported by the runway beams on which the crane travels.

rail sweep--A mechanical device attached to the end truck of a bridge or trolley, located in front of the leading wheels, to remove foreign objects from the rail.

radius (reach)--For mobile equipment, the horizontal distance from the theoretical intersection of the axis of rotating and the vertical center of the hoist line(s).

range diagram--A diagram showing an elevation view of a crane with circular arcs marked off to show the luffing path of the tip for all boom and jib lengths and radial lines marking boom angles. A vertical scale indicates height above ground, while a horizontal scale is marked with operating radii. The diagram can be used to determine lift heights, clearance of the load from the boom, and clearances for lifts over obstructions.

ratchet--A toothed member, attached to or a part of the drum, for engagement with the pawl.

rated load (capacity)--(a) The maximum load designated by the manufacturer for which a crane, hoist, rigging, or other lifting device is designed and built; (b) For a truck equipped with load carriage and forks or attachments it is the weight established by the manufacturer at a required load center that a given truck can transport and stack to an established height.

rated life--See **bearing life**.

rated load (hydraulic jacks)--Maximum load, applied at a specified point, for which the jack is designed and built by a manufacturer for its specified travel.

rated load, lifting (mechanical jacks)--Maximum load, applied at a specified point, which the jack was designed to lift with the specified operating lever.

rated load, sustaining (mechanical jacks)--Maximum load, applied at a specified point, which the jack was designed to sustain.

rated rope (line) pull--The manufacturer's recommended load in pounds (kilograms) applied to the rope attached to the hoist drum.

reach--Distance from the axis of rotation of a crane or derrick, sometimes used synonymously with radius.

rerate--To change the rated load (capacity). The rated load may be increased or decreased.

reel--The flanged spool on which wire rope or strand is wound for storage or shipment.

reeve--The pattern that a rope forms between sheaves in a hoisting system.

reeved blocks--Passing rope through a set of blocks, as opposed to laced blocks, and in such a manner that there are no lines crossed or rubbing each other.

reeving--A rope system in which the rope travels around drums and sheaves in a prescribed manner.

reeving diagram--A diagram showing the path of the rope through a system of sheaves (blocks).

regenerative--A method of control in which the electrical energy generated by the motor is fed back into the power system.

regular-lay rope--Wire rope in which the wires in the strands and the strands in the rope are laid in opposite directions.

remote-operated crane--See **cranes, Types of**.

repetitive pickup point--When operating on a short cycle operation, the rope being used on single layer and being spooled repetitively over a short portion of the drum.

reverse bend--Reeving of a wire rope over sheaves and drums so that it bends in opposite directions.

reverse lay--See **alternate lay**.

revolving superstructure--On a mobile crane, the entire rotating structure less the front end attachment; also called **upper superstructure**.

rigger--See **qualified rigger** and **rigging specialist**.

rigging--The act of attaching hoisting equipment to the load.

rigging hook--See **hook, rigging**.

rigging specialist--A qualified rigger or recognized rigging authority with at least 5 years hoisting and rigging experience selected by the employer to advise or supervise hoisting and rigging activities. (See **qualified rigger**.)

right-hand end--A reference to parts or dimensions on the viewer's right of the centerline of span, established when facing the drive-girder side of the crane.

right-lay--(a) Strand in which the cover wires are laid in a helix having a right-hand pitch, similar to a right-hand screw; (b) Rope in which the strands are laid in a helix having a right-hand pitch, similar to a right-hand screw.

RL--DOE, Richland Operations Office.

rocker beam--Beam used for hoisting flimsy trusses or long flimsy loads. Also used to equalize the weight and to keep a load, such as tank plate, from buckling.

rollers--Relatively small-diameter cylinders or wide-faced sheaves for supporting or guiding ropes.

rooster--One or more struts at the top of a boom or mast, such as a jib strut, a tower-crane top tower, or the struts at the top of the mast of a mobile crane tower attachment.

rope--Refers to wire rope unless otherwise specified.

rope drum--That part of a drum hoist that consists of a rotating cylinder with side flanges on which hoisting rope is spooled in or out (wrapped).

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

running line--A rope that moves over sheaves or drums.

running sheave--A pulley-type device that changes location in relation to the hoisting device.

runway--An assembly of rails, girders, and brackets that form a structural support on which a crane operates.

saddle jib--The horizontal live-load supporting member of a hammerhead-type tower crane having the load falls supported from a trolley that traverses the jib; also called **load jib**.

SAE--Society of Automotive Engineers.

safety factor--See **design factor**.

safe working load (SWL)--See **rated capacity**.

sag--See **deflection**.

seale--A strand construction having one size of cover wires with the same number of one size of wires in the inner layer and each layer having the same length and direction of lay. Most common construction is one center wire, nine inner wires, and nine cover wires.

seize--To bind securely the end of a wire rope or strand with seizing wire or strand.

seizing strand--Small strand, usually of seven wires, made of soft-annealed-iron wire.

seizing wire--A soft-annealed-iron wire.

serve--To cover the surface of a wire rope or strand with a wrapping of wire.

service, normal--That service which involves operation with randomly distributed loads within the rated load limit, or uniform loads of less than 65 percent of the rated load for not more than 15 percent of the time for manually operated hoists and 25 percent of the time for electric- or air-powered hoists, of a single work shift.

service, heavy--that service which involves operation within the rated load limit which exceeds normal service.

service, severe--that service which involves normal or heavy service with abnormal operating conditions.

shackle--A type of clevis normally used for lifting.

shaft, cross (squaring shaft) (drive shaft)--The shaft(s) extending the length of the bridge, used to transmit torque from the motor to a wheel(s) at each end of the bridge.

shall--Word indicating that the rule is mandatory and must be followed.

sheave--A wheel or pulley with a circumferential groove designed for a particular size of wire rope; used to change direction of a running rope.

shock loading--Term used to call attention to the application of any sudden, unplanned loading of equipment that would jeopardize the safety of the lift. Typical examples that could result in shock loading are: (a) rapid travel of the burden block without alteration of speed before all slack is removed from the sling(s), (b) unplanned shifting of the load while suspended, (c) fracture of a lifting system component resulting in the application of unknown loading on remaining components.

should--Word indicating that the rule is a recommendation, the advisability of which depends on the facts in each situation.

side frames--Part of the base mounting of a crawler crane attached to the carbody and supporting the crawler treads, the track roller, and the drive and idler sprockets. Crawler frames transmit crane weight and operational loadings to the ground; also called **crawler frames**.

side pull--That portion of the hoist pull acting horizontally when the hoist lines are not operated vertically.

side loading--A loading applied at any angle to the vertical plane of the boom.

siemens-martin strand--A grade of galvanized strand.

Signal Person/Flagman – A qualified person whose responsibility is to provide direction for equipment movements to the operator through use of voice signals or standardized hand signals.

single galvanized strand--Strand made in the “common grade” or wiped galvanized wire. See **common strand**.

slewing--A crane or derrick function wherein the boom or load-supporting member rotates about a vertical axis (axis of rotation); also called **swing**.

slinging eye--See **lifting eye**.

slings--Wire ropes, chains, or synthetic fabric made into forms, with or without fittings, for handling loads.

slings, braided--A very flexible sling composed of several individual wire ropes braided into a single sling.

slings, endless and grommet wire rope--A wire rope made endless from one continuous length of cable-laid rope with the ends joined by one or more metallic fittings.

slings, four-leg bridle--Sling made with four single-rope legs, secured to a single lifting ring.

slings, three-leg bridle--Slings made with three single-rope legs, secured to a single lifting ring.

slings, two-leg bridle--Slings with single-rope legs, equalizing double-rope legs, or multiple-part rope legs.

slip (motor)--The difference between theoretical, or synchronous, speed and actual speed in an induction motor. Under standard conditions, an induction motor never reaches synchronous speed, at which zero torque is developed.

smooth coil strand--Strand composed entirely of round wires.

snatch block--A single- or double-sheave block arranged so one or both cheek plates can be opened, permitting the block to be reeved without having to use a free rope end; also called **gate block**. (The brand name SKOCUM is also used generically; thus, **snatch blocks** are also called **skocum blocks**.)

socket--Type of wire rope fitting. See **bridge sockets**, **closed sockets**, **open sockets**, and **wedge sockets**.

softeners--Anything used to protect the load or the rigging from damage while making a lift. Also, prevents load from slipping.

span--The horizontal distance center-to-center of runway rails.

special flexible--See **extraflexible** and **extrapliable**.

special-rated capacity--The maximum hook load that a piece of hoisting equipment or the maximum working load that an industrial truck or piece of rigging tackle is permitted to carry, based on its present condition and the operational conditions as determined by an engineering evaluation, load test, or both. The special-rated capacity may be equal to, but not greater than, the rated capacity of equipment established by the manufacturer.

spider--A fitting mounted to a pivot (gudgeon pin) at the top of a derrick mast, providing attachment points for guy ropes; also called **Mast cap**.

spiral groove--A continuous helical groove that follows a path on and around a drum face, similar to a screw thread.

splicing--Interweaving of two ends of ropes to make a continuous or endless length without appreciably increasing the diameter. Also, making a loop or eye in the end of a rope by tucking the ends of the strands.

spooling (rope)--Winding of rope on a cylindrical drum in evenly spaced, uniform layers.

Spotter – An assigned person(s) whose sole responsibility is to provide a warning or stop signal during vehicle or equipment operation prior to violation of proximity restrictions or per-determined distance limitations to structures or hazards such as power and communication lines, overhead obstructions, buildings, telephone poles, ground penetrations and etc. (Some operations require the use of a qualified signalman/flagman as a spotter).

spreader bar--A frame, forming part of the boom suspension, supporting sheaves for the live suspension ropes and attached to the fixed suspension ropes (pendants); also called **bridle**, **spreader**, **live spreader**, or **flating harness**.

spreader beam--A fixture made of rigid parts, such as pipe, wide-flange, I-beam, channel, plate, etc., to assist in rigging a load; also called **lifting beam**.

stabilizers--Devices for increasing stability of a crane; they are attached to the crane base mounting but are incapable of relieving the wheels (crawlers) of crane weight.

stabilizing moment--The moment of the dead-weight of the crane or derrick, less boom weight, about the tipping fulcrum; hence, the moment that resists overturning; also called **machine moment** or **machine resisting moment**.

stainless steel rope--Wire rope made of low-carbon corrosion-resistant steel.

standby--A crane or derrick that is not in regular service, but one that is used occasionally or intermittently as required.

standing line--A fixed-length line that supports loads without being spooled on or off a drum; a line of which both ends are dead; also called **stay rope** or **pendant**.

standing rope--See **guy line**.

standing rope (pendant)--A supporting rope that maintains a constant distance between the points of attachment to the two components connected by the rope.

static base--Tower-crane support (base mounting) where the crane mast is set on or into a foundation.

static controls--Controls that provide a function similar to that of magnetic controls. The accelerating resistors and contactors are replaced with thyristors, silicon-controlled rectifiers (SCRs), and similar static electronic devices. Operating characteristics are similar to those that might be obtained from magnetic control having an infinite number of accelerating contacts between the first and final control points.

statically determinate load--The load or stress in a member that, when determined by arithmetic means, is mathematically accurate.

statically indeterminate load--A load or stress that is determined arithmetically and which has a range of values which cannot be accurately determined mathematically.

stay rope--A fixed-length rope forming part of the boom suspension system; also called **boom guy line**, **hog line**, **boom stay**, **standing line**, or **pendant**.

steel-clad rope--Rope with individual strands spirally wrapped with flat steel wire. See **armored rope**.

stirrup--The U-bolt or eyebolt attachment on a bridge socket.

stop--A member to physically limit the travel of a trolley or bridge. This member is rigidly attached to a fixed structure and normally does not have energy-absorbing ability.

strand, wire rope--A plurality of round or shaped wires helically laid about an axis.

strength margin--The ratio of structural failure load (or stress) to actual or permitted load (or stress).

structural competence--The ability of the equipment and its components to support the stresses imposed by operating loads without the stresses exceeding specified limits.

Superstructure--The rotating upper frame structure of a mobile crane and the operating machinery mounted thereon.

SUS--Saybolt universal seconds.

swaged fittings--Fittings in which wire rope is inserted and attached by a cold-forming method.

swing--Rotation of the superstructure of a mobile crane or derrick boom for movement of loads in a horizontal direction about the axis of rotation.

swing axis--The vertical line about which a crane or derrick swings; also called **center of rotation** (obsolete) or **axis of rotation**.

swing mechanism--The machinery involved in providing rotation of the superstructure or derrick boom.

swingers--(a) Attached--Reversible drum unit arranged to rotate or swing a derrick mast and boom, or some other structure which supports a load lifting or lowering boom, which is attached to and receives its power from a hoist; (b) Independent--Unit directly geared to its own power for rotating or swinging a derrick mast and boom; (c) Rope--Unit provided with one or two reversible drums for winding the rope used for rotating or swinging a bull wheel of a boom supporting structure.

switch--A device for making, breaking, or changing the connections in a control circuit. It is also a device for changing directions of a trolley from one monorail system (track) to another.

switch, emergency stop--A manually or automatically operated electric switch to cut off electric power independently of the regular operating controls.

switch, limit--A switch that is operated by some part or motion of a power-driven machine or equipment to open or close the electrical circuit associated with the machine or equipment.

switch, main--A switch controlling the entire power supply to the crane, often called the **disconnect switch**.

Synchronous speed--The synchronous speed of an alternating current (ac) motor is directly proportional to the supply frequency and inversely proportional to the number of poles. For example, the synchronous speed of a four pole motor operating at 60 Hz is determined by the following equation:

$$\text{Synchronous Speed} = 120 \times \text{Frequency} \div \# \text{ of Poles} \quad \text{therefore: } 120 \times 60 \div 4 = 1800 \text{ r/min.}$$

tackle--Those pieces of rigging such as slings, spreader bars, chokers shackles, thimbles, eyebolts, rings, or other handling fixtures used for attachment of the load to the crane or hoist.

tag line--A length of rope used to guide a load that is being lifted into a desired position.

tailing crane--The crane controlling the base end of the object in a multi-machine operation in which a long object is erected from a horizontal starting position to a vertical final position.

taking up--The process of removing slack from a line or drawing (spooling) in on a line; loading a line by drawing in on it.

tapered tip--The uppermost section of a sectional latticed boom, which usually includes the weldment mounting the upper load sheaves as an integral part; also called **boom point**, **head section**, or **boom tip section**.

technical approver--An individual assigned to review critical lift plans who has technical knowledge and experience applicable to the requirements of this manual, mandatory standards, and equipment identified in the critical lift plan.

test load--A load that is periodically applied to hoisting equipment to ensure that it has the ability to safely handle the rated capacity of the equipment. The test load is usually some percentage of the rated load capacity--100 percent to 150 percent of rated load.

thimble--Grooved-metal fitting designed to prevent crushing or overstressing wire rope at the terminal end which is used to protect the eye of a wire rope or sling.

third-party inspection--An inspection made by an independent party who is a crane and hoist specialist. See **qualified inspector**.

tiller rope--A very flexible operating rope, commonly made by cable laying six 6 x 7 ropes around a fiber core.

tinned wire--Wire coated with tin.

tipping fulcrum--The horizontal line about which a crane or derrick will rotate should it overturn; the point(s) on which the entire weight of a crane or derrick will be imposed during tipping.

tipping lift--Refer to **boom hoist**.

tipping load--The load for a particular operating radius that brings the crane or derrick to the point of incipient tipping.

topping--See **derrick**.

torque, locked-rotor--The minimum torque which an induction motor will develop at rest, for all angular positions of the rotor, with rated voltage applied at rated frequency. Not applicable to wound-rotor (slipping motors).

torque, motor breakdown--The maximum torque that an induction motor will develop with rated voltage applied at rated frequency without an abrupt drop in speed.

torque, motor full-load--The torque developed by an electric motor (ac or direct current [dc]) to produce its rated horsepower at rated full-load speed.

torque, motor pull-up--The minimum torque developed by an induction motor during the period of acceleration from rest to the speed at which breakdown torque occurs. For induction motors with 8 percent or greater slip, the pull-up torque, the breakdown torque, and the starting torque are all equal and occur at zero speed.

traction steel--A grade of wire rope used in elevator service. See **grades, rope**.

tram--The practice of placing punch marks on a hook for gauging use.

transit--Moving or transporting a mobile crane from one job site to another.

travel--(a) Movement of a mobile or wheel-mounted crane about a job site under its own power;

(b) Linear extending or retracting movement of a jack.

travel base--The base mounting for a wheel-mounted (traveling) tower crane.

tread diameter--The diameter of a sheave or grooved rope drum measured at the base of the groove. The diameter of a smooth barrel on a rope drum.

trolley--A unit that travels on the bridge rails consisting of frame, end trucks, drive supporting the hoisting mechanism, rope, and load block that supports the load, or a unit that travels on the lower flange of a beam or monorail system supporting a hoist.

trolley girts--Structural members that are supported on the trolley trucks and contain the upper sheave assemblies.

trolley travel--The trolley movement.

trolley truck--An assembly consisting of wheels, bearings, axles, and structural framework that supports the hoist mechanism.

turnbuckle--Device attached to wire rope chain or rods for making limited adjustments in length, which consists of a barrel and right-hand and left-hand threaded bolts.

two-block damage prevention feature--A system that will stall when two-blocking occurs without causing damage to the hoist rope or crane machinery components. See **anti-two-block device**.

two-block warning feature--A warning device to alert the operator of an impending two-blocking condition. See **anti-two-block device**.

two-blocking--The condition in which the lower load block assembly comes in contact with the upper load block or boom-point sheave assembly.

UBC--Uniform Building Code.

UL--Underwriters Laboratory.

ultimate strength--The maximum conventional stress, tensile, compressive, or shear that a material can stand without failure.

vangs (vangs lines)--Tackle attached to each side of a derrick boom near the outer end, and to the base or pontoon at a lateral distance, by means of which the boom is rotated (slewed) from one side to the other.

verification--A procedure, instruction, report, or document that is checked for validity and signed by one or more parties. The person designated to sign verifies that a specific action has been performed in accordance with specified requirements, usually based on personal observation, certified records, or a direct report.

wall crane--See **cranes, Types of, - jib crane**.

warrington--A wire rope strand construction in which one layer of wires, usually the outer, is composed of alternating large and small wires.

weather crane--To swing with the wind when out of service to expose a minimum area to the wind.

web plate--The vertical plate(s) connecting the upper and lower flanges or cover plates of a girder.

wedge socket--Wire rope fitting in which the rope end is secured by a wedge.

wheel load--Load placed on a bridge or trolley wheel.

wheel load, bridge--The vertical force (without impact) produced on any bridge wheel by the sum of the rated load, trolley weight, and bridge weight, with the trolley so positioned on the bridge as to give maximum loading.

wheel load, trolley--The vertical force (without impact) produced on any trolley wheel by the sum of the rated load and the trolley weight.

wheelbase--The distance from center to center of the outermost wheels of the bridge or trolley, measured parallel to the rail.

whipline (runner or auxiliary line)--A separate hoist rope system usually of a lighter load capacity than provided by the main hoist. Standard Hanford Site terminology is **auxiliary hoist**.

winch head (gypsy head)--A rotatable cylindrical drum with curved end flanges, used for load handling by means of fiber rope coiled about its barrel with hand tension applied to the nonload end. Also called a capstan.

windlass--A base-mounted machine, usually power-operated, used for hauling in or paying out rope or chain.

wire rope--A plurality of strands of wire laid helically around an axis or a core.

wire (round)--A single, continuous length of metal, cold drawn from a rod.

wire (shaped)--A single, continuous length of metal either cold drawn or cold rolled from a rod.

WISHA--Washington Industrial Safety and Health Act.

wrap--One circumferential turn of wire rope around a rope drum barrel.

working load limit--WLL (see rated capacity).

WSMA--Web Sling Manufacturers Association