# PRACTICE EXAM 10

**NCCCO Core Written Exam Simulation — 90 Questions**

**Time Allowed: 90 Minutes | Format: Multiple Choice | Passing Score: 70% (Scaled)**

*Answer all 90 questions. Do not leave any question blank. Record your answers on a separate sheet before checking the answer key.*

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**DOMAIN 1: SITE WORK**

**Questions 1–18**

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**1.** A crane is being set up on a site where fill material was placed over native soil 5 years ago. The fill depth varies from 2 to 8 feet across the setup area. No compaction testing was performed when the fill was placed. What is the primary concern?

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A. Five-year-old fill has consolidated sufficiently to be treated as equivalent to native soil for crane setup purposes

B. Uncontrolled fill of unknown compaction has unpredictable and potentially very low bearing capacity that must be evaluated by a geotechnical engineer before crane setup

C. The fill depth variation is the primary concern — position outriggers only on areas where fill depth is 2 feet or less

D. Request the fill material type from the site owner — granular fill is always adequate for crane setup regardless of compaction history

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**2.** A crane operator is setting up when they notice the planned outrigger position is directly over a storm drain inlet grate. The grate is 24 inches square and appears structurally intact. What must happen before positioning the outrigger over this location?

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A. Avoid the grate entirely — storm drain inlets are prohibited outrigger positions under OSHA 1926 Subpart CC

B. Place a steel plate over the grate to distribute the load and proceed — steel plates satisfy the structural requirement for grate coverage

C. The storm drain inlet and the pipe or structure below it must be evaluated for structural capacity under the anticipated outrigger load before positioning over this location

D. Confirm the grate is bolted down before proceeding — a secured grate is structurally adequate for standard crane outrigger loads

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**3.** Under OSHA 1926.1402, which of the following is the controlling entity specifically obligated to provide before crane setup?

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A. All available information about ground conditions including the location of underground utilities, known subsurface conditions, and the proximity of structures that could affect crane operations

B. A written certification signed by a licensed engineer confirming the ground is adequate for the planned crane configuration

C. Copies of all previous soil investigation reports conducted at the site regardless of their age or applicability

D. A site-specific lift plan approved by the project safety officer before any crane is positioned on the site

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**4.** A crane is operating on a site when a sinkhole approximately 3 feet in diameter opens up 25 feet from the nearest outrigger. Operations are in progress with a load suspended. What is the correct immediate response?

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A. Continue operations — a sinkhole 25 feet from the outrigger is outside the crane's influence zone

B. Reduce all subsequent picks to 50% of rated capacity while the sinkhole is investigated

C. Notify the lift director and monitor the sinkhole for growth before deciding on further action

D. Land the load immediately and move the crane away from the area — a sinkhole indicates active subsurface void development that can propagate rapidly toward the crane's position

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**5.** A utility locate identifies a 4-inch gas distribution line at 30-inch depth crossing the planned crane travel path. The crane's maximum ground bearing pressure during travel is 85 psi. What must be confirmed before the crane travels over this line?

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A. Gas lines at 30-inch depth are below the influence zone of crane travel loads — no evaluation is required

B. The gas line's structural capacity under the crane's travel load must be confirmed by the utility owner or a qualified engineer before the crane crosses

C. Travel over gas lines is permitted when the depth exceeds 24 inches — the 30-inch depth satisfies this standard

D. Notify the gas company of the planned travel and proceed after 24 hours — notification satisfies the crossing requirement

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**6.** A crane is set up adjacent to a freshly excavated trench 6 feet deep and 4 feet wide. The nearest outrigger is 4 feet from the trench edge. The soil is classified as Type B. What concern does this configuration create?

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A. The 4-foot setback exceeds OSHA's 3-foot minimum for Type B soil excavations — no further evaluation is required

B. A 4-foot setback is always adequate for any trench regardless of depth, width, or soil type

C. No concern — outrigger loads at 4 feet from a 6-foot trench in Type B soil are within standard construction tolerances

D. This is not something that can be evaluated using a minimum distance rule — the outrigger loads applied near the trench edge must be evaluated for their effect on trench wall stability by a competent person

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**7.** A crane is operating in an area where the ground surface temperature is 105°F due to direct sun exposure on dark asphalt. The pre-shift inspection confirmed adequate ground conditions at 7:00 AM when the temperature was 72°F. What concern applies by midday?

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A. Asphalt softens significantly at elevated surface temperatures — the bearing capacity of the asphalt layer may have reduced substantially since the morning inspection; outrigger conditions must be re-evaluated before afternoon picks

B. Surface temperature does not affect the structural capacity of asphalt — only subsurface temperature changes affect bearing capacity

C. The concern is limited to outrigger pad adhesion — hot asphalt can bond to rubber pads making repositioning difficult

D. Re-inspect the asphalt surface for visible softening — if no deformation is visible proceed without restriction

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**8.** A job site geotechnical report specifies the crane must maintain a minimum setback of 15 feet from the edge of a retaining wall. The planned setup has the nearest outrigger at 12 feet from the wall. What must happen before setup proceeds?

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A. Proceed — the 3-foot deviation from the geotechnical recommendation is within normal field adjustment tolerance

B. Confirm the retaining wall height — setbacks less than the recommended distance are permitted for walls under 8 feet tall

C. Reduce all picks to 75% of rated capacity to proportionally reduce the outrigger reaction forces to within the 15-foot setback equivalent

D. The geotechnical engineer who specified the 15-foot setback must evaluate whether the 12-foot position is acceptable — the setback is an engineering determination that cannot be adjusted by field judgment

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**9.** A crane is operating on a pier structure over water. During the third pick of the day, the operator notices a hairline crack has appeared in the concrete deck surface near the right-rear outrigger. No crack was present during the pre-shift inspection. What must the operator do?

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A. Complete the current pick and re-inspect the crack after the load is set — monitoring over multiple picks determines if the crack is growing

B. Land the load immediately — a crack that develops during operations near an outrigger position indicates the pier deck may be reaching its structural limit at that location; the condition must be evaluated by a structural engineer before any further lifting

C. Reduce all subsequent picks to 60% of rated capacity — the reduced load proportionally reduces the stress at the crack location

D. Notify the pier owner and document the crack — owner notification transfers liability for any further structural damage

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**10.** Under OSHA 1926 Subpart CC, when a crane is used on a barge or vessel, which of the following CORRECTLY describes an additional requirement that applies?

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A. The crane's load chart must be derated by 15% for all marine operations regardless of sea state

B. The crane operator must hold a U.S. Coast Guard endorsement for marine crane operations before operating from a vessel

C. The barge or vessel must be stable and the crane must be positioned and operated in a manner that accounts for the marine environment including list, trim, and wave action

D. Marine crane operations require a third-party marine surveyor present during all lifting operations

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**11.** A crane is being repositioned to a new setup location on the same site. The travel path crosses an area that was used as a staging area for steel reinforcement for 6 months. The steel has since been removed. What specific concern does this area present?

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A. The weight of the stored steel over 6 months may have increased the bearing capacity of the soil through preconsolidation — the area is likely stronger than surrounding soil

B. Extended storage of heavy material can cause settlement and soil disturbance — the previously loaded area may have reduced bearing capacity or uneven settlement that affects crane travel stability

C. Staging areas for steel are always paved — confirm the pavement thickness before traveling over this area

D. No concern — the steel has been removed and the area returns to its original bearing capacity immediately

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**12.** A crane is set up and operating when a neighboring contractor begins dewatering an excavation 60 feet away by pumping groundwater. After 2 hours of dewatering, the operator notices one outrigger has settled 0.5 inches. What does this indicate?

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A. Half-inch settlement over 2 hours is within normal consolidation behavior — continue monitoring and proceed

B. The dewatering operation is removing water from a different soil stratum than the crane's influence zone — the settlement is coincidental

C. Dewatering operations 60 feet away do not affect the groundwater table beneath the crane's setup area

D. Dewatering can lower the groundwater table beneath the crane, causing consolidation settlement in fine-grained soils — 0.5 inches of settlement during active dewatering may indicate ongoing consolidation; operations must stop and the condition evaluated

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**13.** A crane operator is asked to set up in an area that the site superintendent describes as having "good hard ground." No soil investigation data is available. Under OSHA 1926.1402, may the operator proceed based on this description?

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A. Yes — a site superintendent's assessment of ground conditions satisfies the controlling entity's disclosure obligation under OSHA 1926.1402

B. No — "good hard ground" is not verified ground condition information; the controlling entity must provide actual ground condition data before the operator is obligated to proceed; a superintendent's subjective description does not constitute the required disclosure

C. Yes — the operator's own visual assessment combined with the superintendent's confirmation satisfies the ground condition requirement

D. Yes — proceed at 80% of rated capacity to compensate for the unverified ground conditions until a formal investigation can be arranged

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**14.** A crane is set up on a site where a large concrete foundation pour occurred 3 days ago immediately adjacent to the setup area. The concrete is still gaining strength. What concern does the nearby curing concrete create?

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A. Curing concrete does not affect adjacent soil conditions — the concern is limited to chemical contamination of the outrigger pads

B. Freshly cured concrete near an outrigger area may have altered adjacent soil moisture and chemistry — but the primary concern is that the foundation excavation and pour may have disturbed or removed lateral support from the soil the outrigger is bearing on

C. Three-day-old concrete has reached 95% of its design strength — no concern applies after 72 hours of cure time

D. The concern is limited to concrete truck traffic damage to the outrigger area during the pour — if no traffic crossed the outrigger positions, no evaluation is needed

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**15.** Under OSHA 1926 Subpart CC, what is the minimum approach distance for crane operations near energized power lines rated between 50 kV and 200 kV?

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A. The minimum approach distance for lines rated between 50 kV and 200 kV is calculated using OSHA Table A — 10 feet plus 0.4 inches per kV above 50 kV; for a 200 kV line this equals 10 feet plus 60 inches, or 15 feet

B. 20 feet for all lines between 50 kV and 200 kV regardless of the specific voltage

C. 25 feet for all transmission-level voltages above 50 kV

D. 15 feet for lines between 50 and 100 kV and 20 feet for lines between 100 and 200 kV

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**16.** A crane is operating on a site when the operator is informed that a water main break occurred overnight and was repaired before the shift began. The break was located 45 feet from the crane's right-front outrigger. What must the operator evaluate before continuing operations?

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A. Overnight water main breaks that have been repaired do not affect daytime crane operations — the repair restores pre-break conditions

B. The concern is limited to the repair trench — confirm the repair crew backfilled and compacted the trench before proceeding

C. A water main break 45 feet away is outside the influence zone of the crane's outrigger loads — no evaluation is required

D. The overnight water release may have saturated the soil between the break location and the crane's outrigger positions — the right-front outrigger area must be evaluated for saturation before picks resume

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**17.** A crane is being set up on a slope where the grade is 3% running from front to back. The manufacturer's maximum setup slope is 1%. The operator plans to use the outrigger cylinders to level the crane. Is this approach acceptable?

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A. Leveling with outrigger cylinders is always acceptable regardless of the underlying slope — the cylinders compensate for any grade

B. Using the outrigger cylinders to compensate for a slope greater than the manufacturer's maximum setup slope is not acceptable — the manufacturer's slope limit applies to the underlying grade, not the leveled crane position; a 3% slope exceeds the 1% limit and the crane must not be set up at this location without engineering evaluation

C. A 3% slope is within the standard field tolerance above the 1% manufacturer limit — outrigger leveling satisfies the requirement

D. Level the crane with outrigger cylinders and confirm level within 0.5 degrees — if the level is achieved, the underlying slope is no longer relevant

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**18.** A crane is operating on a construction site in an area where underground mine workings are mapped at 40-foot depth. The workings are shown on historical maps as abandoned rooms approximately 20 feet wide and 8 feet high. What must occur before crane operations begin in this area?

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A. Forty feet of overburden is sufficient to support any standard crane outrigger load regardless of the void geometry below

B. Underground utility locates must be completed before crane setup in any area with mapped subsurface features

C. A geotechnical engineer with experience in mine subsidence must evaluate whether the mapped workings create a ground failure risk under the anticipated crane loads before operations begin

D. Operations may proceed at 50% of rated capacity — the reduced loads proportionally reduce the risk of mine subsidence

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**DOMAIN 2: OPERATIONS**

**Questions 19–41**

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**19.** A crane operator receives a load-in signal while the previous load is still swinging after being set. The signal person is directing a new pick immediately. What must the operator do?

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A. Decline to begin the new pick until the previously set load has fully stabilized and all ground personnel have confirmed clear of both the previous set and the new pick area

B. Begin the new pick — the signal person has confirmed the area is clear by giving the signal

C. Begin the new pick at reduced speed to minimize the risk from the still-swinging previous load

D. Request the lift director confirm the dual-load risk is acceptable before proceeding with the new pick

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**20.** Under OSHA 1926 Subpart CC, which of the following crane functions must be tested during the pre-shift inspection?

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A. The load line must be proof-tested to 110% of the planned pick weight before the first pick of each shift

B. All limit switches must be tested by physically driving the crane to each limit position before the first pick

C. The LMI must be calibrated using a known reference weight before the first pick of each shift

D. All functions must be tested with no load — including hoist, boom, swing, and travel — before any loads are lifted; limit switches and safety devices must be confirmed operational

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**21.** A crane is performing a pick when the designated signal person's radio fails mid-lift with the load at 15 feet of height. A backup radio is available but is 30 feet away. What is the correct response?

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A. Continue the pick using visual hand signals — when radio communication fails, hand signals are the automatic fallback method

B. Stop all crane movement and hold the load at its current position while the signal person retrieves the backup radio and reestablishes communication before any further movement

C. Lower the load slowly to the ground using the operator's judgment — without communication, landing the load is always the safest response

D. The lift director may take over verbal communication from their position until the signal person's radio is restored

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**22.** A crane operator is told the load weighs 32,000 lb based on the vendor's shipping manifest. The crane's net capacity at the planned configuration is 35,500 lb. Before picking, what concern applies to the weight source?

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A. A vendor's shipping manifest is a certified document — it satisfies the weight verification requirement for any pick below 90% of net capacity

B. Shipping manifests are always accurate to within 2% — the 3,500 lb margin covers this tolerance

C. A shipping manifest may reflect the product weight without including packaging, rigging attachments, or other materials that are part of the total hook load — the operator must confirm the manifest weight represents the complete payload as rigged

D. Shipping manifest weights are considered certified only when accompanied by the manufacturer's signed weight certificate

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**23.** A crane operator notices during a pick that the load line is rubbing against the edge of the boom tip sheave guard rather than running freely through the sheave groove. The load is 6 feet off the ground. What must the operator do?

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A. Lower the load immediately — rope contact with any structural component other than the sheave groove causes progressive wire damage and indicates a reeving or sheave problem that must be investigated before further picks

B. Continue the pick — minor rope-to-guard contact at low hook heights is a normal condition that resolves as the hook rises

C. Increase boom angle to redirect the rope into the sheave groove and continue the pick

D. Complete the pick and inspect the rope contact area during the post-shift inspection before the next shift

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**24.** Under OSHA 1926 Subpart CC, what is the operator's obligation when the load chart for the crane currently being operated is not available in the cab?

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A. Use the load chart from a similar crane of the same model year — capacity values are standardized within model families

B. Contact the crane owner for the chart by phone — verbal confirmation of chart values satisfies the availability requirement

C. Operate at 75% of the highest capacity value from the operator's memory of previous charts for this crane type

D. Do not operate the crane — the load chart must be physically present in the cab before any lifts are made; operating without the load chart is a direct OSHA 1926.1417 violation

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**25.** A crane is performing a pick when the operator observes a second crane on the adjacent site swinging its load toward the shared property line. The second crane's load path appears to encroach on the first crane's boom tip area. What must the first crane's operator do?

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A. Sound the horn to alert the second crane operator and continue — audible warning is the required response for adjacent crane conflicts

B. Stop all crane functions immediately and communicate the conflict to both lift directors — two cranes operating in proximity without a documented interaction plan creates an immediate collision risk that must be resolved before either crane continues

C. Retract the boom to clear the second crane's load path and continue operations from the reduced radius

D. The second crane's lift director is responsible for maintaining clearance — the first crane operator has no obligation to stop for another employer's equipment

**26.** A crane is performing a critical lift at 88% of net capacity. The lift director instructs the operator to hold the load at 40-foot height for an extended period while work below is completed. After 8 minutes of holding, the operator notices the load has descended 3 inches without any control input. What must happen?

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A. Re-engage the hoist control slightly to stop the descent and maintain position — minor brake drift during extended holds is normal hydraulic behavior

B. Continue monitoring — 3 inches over 8 minutes is within the acceptable brake drift rate for hydraulic hoist systems

C. Land the load at the nearest safe position immediately — any downward load movement without operator input indicates the hoist brake is not holding; at 88% of net capacity this is a critical deficiency requiring immediate action

D. Increase engine RPM to restore hydraulic brake pressure and stop the drift before landing the load

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**27.** Under OSHA 1926 Subpart CC, when must an operator perform a pre-shift inspection after a crane has been idle overnight on a construction site?

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A. Before the first lift of the new shift regardless of what was inspected at the end of the previous shift — the overnight period creates new exposure to weather, unauthorized access, and environmental changes that the previous shift's inspection did not capture

B. Only if overnight precipitation occurred — dry overnight periods do not require a new pre-shift inspection

C. Within the first hour of the shift — the operator may make initial picks before completing the pre-shift inspection if the lift director authorizes early start operations

D. Only if the crane was left unattended in an unsecured area overnight — secured cranes do not require a new pre-shift inspection after idle periods

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**28.** A crane operator is performing a lift when the swing function stops responding to control input. The load is suspended at working height mid-swing. What is the correct sequence of actions?

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A. Apply the swing brake and attempt to restore swing function by cycling the control — if swing is restored, complete the pick

B. Radio the lift director and wait for instructions — the lift director must authorize all responses to equipment malfunctions

C. Lower the load to the nearest safe landing using the hoist function while maintaining the current swing position — do not attempt to force swing movement without confirmed hydraulic function

D. Attempt to use the boom hoist to reposition the load — changing boom angle can shift the load's position without requiring swing function

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**29.** A crane operator is conducting operations when they observe that a co-worker has climbed onto the load to guide it into position at the set point. The signal person has not given a stop signal. What must the operator do?

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A. Proceed slowly — the co-worker on the load can guide it into position more accurately than taglines

B. Stop all crane movement immediately — personnel are never permitted on a suspended load; this is an unconditional stop condition regardless of any signal or instruction received

C. Sound the horn and continue at minimum speed — the audible warning alerts the co-worker to clear before the load is set

D. Request the lift director authorize the unconventional set method before continuing

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**30.** A crane's hoist rope is being paid out for a long lower when the operator notices the rope layers on the drum have become disorganized — upper wraps have crossed over lower wraps creating an uneven drum profile. The load is 45 feet below ground grade in an excavation. What must the operator do?

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A. Continue lowering — disorganized drum spooling only becomes a concern when re-hoisting from the maximum lower position

B. Increase lower speed to quickly reach the set point and address the drum condition before re-hoisting

C. Stop the lower immediately — disorganized drum spooling causes the rope to be crushed at the crossover points on re-hoist; the crane must not re-hoist until the rope is properly respooled on the drum

D. Reduce lower speed to minimum and complete the lower — slow speed prevents further disorganization during the remaining descent

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**31.** Under OSHA 1926 Subpart CC, which of the following describes a condition where the operator is permitted to leave the cab while a load is suspended?

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A. There is no condition under which an operator may leave the cab with a load suspended — OSHA 1926.1417 is absolute; the load must be fully landed and all rigging tension released before the operator may exit the cab under any circumstance

B. The operator may leave if the lift director physically assumes control of the crane's functions

C. The operator may leave for up to 5 minutes for a restroom break if the load is within 2 feet of the set surface

D. The operator may leave if a second certified operator takes responsibility for monitoring the suspended load from outside the cab

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**32.** A crane operator is performing a pick in a congested area when the signal person gives a stop signal but does not provide any explanation. The operator stops all functions. After 3 minutes, the signal person has not resumed signals and cannot be reached by radio. What must the operator do?

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A. Resume operations using the last confirmed travel signal — a 3-minute unexplained stop indicates a radio malfunction, not a safety hazard

B. Lower the load slowly to the ground — with no communication restored after 3 minutes, landing the load is the appropriate response

C. Hold the load at its current position and continue attempting to reach the signal person — do not move in any direction until communication is restored or the signal person returns

D. Contact the lift director for instructions — the lift director may authorize resumption based on their situational awareness

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**33.** A crane operator finishes a shift and prepares to hand the crane over to the next operator. The outgoing operator has identified a developing hydraulic leak at the boom hoist cylinder but the leak rate is slow — approximately 1 drop per 5 seconds. What is the correct action before handover?

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A. Document the leak in the handover log and advise the incoming operator to monitor it during the next shift

B. Report the leak as a deficiency to the person responsible for crane maintenance — a developing hydraulic leak at a cylinder is a removal-from-service condition that must be evaluated before the crane is operated further regardless of the current leak rate

C. Tighten the fitting before handover — if tightening reduces the rate to less than 1 drop per 10 seconds, the crane is acceptable for the next shift

D. Advise the lift director of the leak and allow the lift director to decide whether to remove the crane from service

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**34.** A crane is performing operations when the operator receives a hoist-up signal but visually observes that the rigging appears to have only one of the planned four sling legs attached to the load. What must the operator do?

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A. Follow the signal — the signal person has confirmed readiness and has direct visual contact with the rigging that the operator may not

B. Hoist slowly until the rigging tension confirms whether all four legs are engaged before continuing to working height

C. Stop and not move any crane function — the operator's direct observation of a potential rigging deficiency requires the pick to stop regardless of the signal received; the rigging must be physically confirmed before any tension is applied

D. Sound the horn to alert the rigger and hoist slowly — the horn alerts the rigger to check the rigging while the operator hoists

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**35.** A crane operator is operating in an area near high-voltage power lines when the crane's boom inadvertently contacts a line. The operator is in the cab and the crane is now energized. No fire has started. What is the correct action for the operator?

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A. Stay in the cab, do not touch any metal surfaces, sound the horn continuously, and call for emergency services — exiting the cab while the crane is energized and in contact with a line creates a step-potential electrocution hazard for the operator; the operator must remain in the cab until the utility confirms the line is de-energized or emergency responders direct otherwise

B. Exit the cab immediately and jump clear of the crane — the longer the operator remains in the cab, the greater the electrocution risk

C. Drive the crane away from the line using the travel function — moving the crane breaks the contact and eliminates the ongoing hazard

D. Use the boom hoist to raise the boom away from the line — boom movement can break the contact without requiring the operator to exit

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**36.** A crane is performing a tandem lift with a second crane. During the lift, the lift director loses radio contact with Crane B's operator. Crane A's operator can see Crane B but cannot reach its operator. The load is at working height. What must Crane A's operator do?

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A. Continue the lift using visual cues from Crane B's movements to maintain coordination

B. Signal Crane B's operator using hand signals to coordinate the set without radio communication

C. Slow to minimum speed and complete the set — the lift director can reestablish communication after the load is set

D. Stop all crane movement immediately — a tandem lift cannot be safely completed without confirmed communication between all cranes and the lift director; Crane A must stop and hold until communication is restored with Crane B

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**37.** Under OSHA 1926.1431, which of the following is required before personnel may be hoisted in a personnel platform?

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A. The crane used must be a dedicated personnel hoisting crane — cranes used for material hoisting during the shift may not be used for personnel hoisting on the same day

B. A trial lift must be performed with a test weight equal to the platform's rated capacity, the platform must be inspected after the trial lift, and a pre-lift meeting must be held with all personnel involved before any personnel board the platform

C. Each person boarding the platform must sign a safety acknowledgment form confirming they understand the risks of personnel hoisting operations

D. The personnel platform must have been inspected by a third-party inspector within the last 30 days before use

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**38.** A crane operator is completing a long shift when they notice they are making small control input errors — applying hoist when they intend to swing, and vice versa. The operator catches each error before it causes a problem. What must the operator do?

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A. Focus more carefully on each control input and continue — self-correcting errors is the expected operator response to fatigue

B. Reduce all picks to 70% of rated capacity for the remainder of the shift — lighter loads require less precise control inputs

C. Stop operating and notify the supervisor — involuntary control input errors indicate cognitive fatigue that constitutes operator impairment; the operator must not continue operating under OSHA 1926.1417

D. Take a 20-minute break and consume caffeine — refreshed cognition restores safe operating capacity after fatigue-related errors

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**39.** A crane is picking a load when the load line's angle from vertical is measured at 6 degrees at lift-off. The load has not moved horizontally. What does a 6-degree line angle at lift-off indicate?

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A. The load is constrained below — a line angle at lift-off without horizontal load movement indicates the load is caught on something beneath the surface or held by an adjacent constraint; hoisting against a constrained load builds tension without corresponding LMI increase; all functions must stop and the constraint investigated

B. A 6-degree line angle is within normal operational tolerance at lift-off — proceed to working height

C. The crane is slightly out of level — re-level before continuing the pick

D. The block is not centered over the load's center of gravity — reposition the block and retry the pick

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**40.** A crane operator is asked to lower a load into a confined space where the load must pass through a 4-foot diameter opening. The load itself is 3 feet 8 inches in diameter. What specific concern does this clearance create?

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A. The 4-inch clearance is within OSHA's minimum of 3 inches for confined space load lowering

B. A 4-inch total clearance between load and opening is adequate for loads under 20,000 lb

C. Confirm the rigging clears the opening — the load fits but the sling geometry at the attachment point may be wider than the load itself

D. The tight clearance requires a dedicated signal person with visual contact of both the load and the opening throughout the entire lower — 4 inches of total clearance leaves no margin for load swing or line angle

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**41.** A crane operator is told by the lift director that the planned 3-part line reeving must be changed to 5-part line mid-shift because a heavier load has been added to the schedule. The current load is on the ground. What must happen before the reeving change is made?

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A. No additional action — the reeving change is the rigger's responsibility; the operator waits until the change is complete and then confirms the new LMI reading before picking

B. The operator must confirm the new drum capacity for 5-part reeving, verify the applicable load chart section for 5 parts of line, and ensure the reeving change is made correctly before any pick is attempted with the new configuration

C. The lift director's authorization for the reeving change is sufficient — proceed after the riggers complete the physical change

D. The reeving change requires the crane to be shut down and restarted — the control system must reset before recognizing the new reeving configuration

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**DOMAIN 3: TECHNICAL KNOWLEDGE**

**Questions 42–66**

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**42.** Under ASME B30.5, which of the following is NOT a required item for the frequent inspection?

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A. Wire rope condition including broken wires, kinking, and diameter reduction

B. Hook condition including deformation, cracks, and safety latch function

C. Load chart accuracy verification against the crane manufacturer's published specifications

D. Functional operation of all crane controls and safety devices

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**43.** A wire rope sling has been used in a basket hitch around a smooth cylindrical pipe. The sling shows no broken wires but the outer wires on the contact side of both legs show approximately 25% wear from the pipe surface. Under ASME B30.9, what action is required?

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A. A qualified person must evaluate whether the 25% wear has reduced the sling's effective capacity below what is required for the planned application — 25% outer wire wear is approaching the one-third removal threshold and requires professional assessment

B. The sling may continue in service — outer wire wear below 33% is within all ASME B30.9 criteria without restriction

C. Reduce the sling's working load limit by 25% to compensate for the reduced cross-section

D. The sling must be removed from service — any visible outer wire wear from contact requires immediate replacement

**44.** A crane's boom is found during periodic inspection to have a bent diagonal lacing member — the member has a visible bow of approximately 0.75 inches over its 18-inch length. What is required?

A. Monitor the bend measurement at each subsequent inspection — action is required when the bow exceeds 1 inch

B. Operate at 85% of rated capacity with enhanced boom inspection frequency until the member is replaced

C. Replace the bent member at the next scheduled maintenance interval — continued operation is acceptable until then

D. Remove the crane from service — any deformation of a boom structural member is a removal condition; the bent lacing member indicates the boom has been subjected to forces beyond its design envelope and must be evaluated by a qualified engineer before the crane returns to service

**45.** Under ASME B30.9, what is the minimum sling angle from horizontal recommended for wire rope slings before additional engineering evaluation is required?

A. 45 degrees — angles below 45 degrees require the use of a spreader bar under all circumstances

B. 30 degrees — below this angle the tension in each sling leg increases so dramatically that the rated capacity may be exceeded at modest load weights; engineering evaluation is required for angles below this threshold

C. 20 degrees — the practical minimum for wire rope slings in standard rigging applications

D. 60 degrees — ASME B30.9 recommends 60 degrees as the preferred minimum for all wire rope sling applications

**46.** A crane is equipped with a rated capacity limiter that activates and cuts power to the hoist when the load moment approaches 100% of rated capacity. During a pick, the rated capacity limiter activates and the hoist stops with the load 3 feet off the ground. What does this indicate?

A. The rated capacity limiter has malfunctioned — it should not activate below 105% of rated capacity

B. The actual load moment has reached the limiter's activation threshold — the load is at or near rated capacity; the load must be set down and the actual hook load, operating radius, and configuration all verified before another attempt

C. Reset the limiter and continue — a single activation is within normal operating parameters for the device

D. The limiter activation confirms the LMI is reading correctly — proceed after confirming the LMI reads below 95% with the load on the ground

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**47.** Under OSHA 1926 Subpart CC, who may serve as a qualified rigger on a construction project where covered cranes are operating?

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A. A person who, by possession of a recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience, has demonstrated ability to solve or resolve rigging problems — the qualification is specific to the type of rigging being performed

B. Any person who has completed a rigging safety awareness course within the last 2 years

C. Any person designated by the employer's safety officer as a competent rigger for the project

D. Only persons holding current NCCCO Rigger Level I or Level II certification

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**48.** A wire rope sling is found during inspection to have a section where the outer strand has unwound from the rope body by approximately 3 inches, creating a loop of strand standing away from the rope. What is this condition and what must happen?

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A. This is called "strand protrusion" — re-seat the strand by hand and return the sling to service at 80% of rated capacity

B. This is called "strand separation" — wrap the protruding section with wire and return the sling to service after re-inspection

C. This is called "unlaying" — the rope has lost its lay and the condition will self-correct under load tension

D. This condition — sometimes called strand kickback or strand protrusion — indicates severe internal damage; the rope must be removed from service immediately; the protruding strand cannot be reseated without leaving residual damage

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**49.** A crane operator's NCCCO certification is current for Lattice Boom Truck (LBT) cranes. The operator is assigned to operate a Lattice Boom Crawler (LBC) crane for a two-week project. What is required before the operator may legally operate the LBC?

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A. The site safety officer may issue a two-week temporary operating authorization for operators holding any lattice boom certification

B. The operator must obtain LBC certification or qualification — LBT and LBC are separate NCCCO crane type categories; a lattice boom truck certification does not cover lattice boom crawler operations under OSHA 1926.1427

C. The lift director may authorize the operation based on the operator's lattice boom experience — a two-week authorization is within the lift director's authority

D. No additional qualification is required — all lattice boom cranes use the same certification under the NCCCO lattice boom program

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**50.** Under ASME B30.10, which of the following hook conditions is NOT listed as a mandatory removal-from-service criterion?

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A. Any visible crack in the hook body

B. Throat opening increase of 15% or more from the hook's original specification

C. Surface rust covering more than 50% of the hook body's visible surface area

D. Twist of more than 10 degrees from the hook's original plane

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**51.** A crane's periodic inspection reveals that the load block's upper swivel bearing is stiff and does not rotate freely when the hook is turned by hand. The block has been in service for 22 months. What is required?

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A. The stiff swivel bearing is a deficiency — a swivel that does not rotate freely can transmit torque to the load line during picks, accelerating rope wear and potentially causing uncontrolled load rotation; the block must be serviced before returning to service

B. Lubricate the swivel bearing and re-check rotation — if rotation improves, return the block to service

C. Monitor swivel stiffness at each frequent inspection — removal is required only when the swivel completely stops rotating

D. Swivel bearing stiffness is normal after 22 months of service — no action is required until the next scheduled bearing replacement interval

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**52.** A crane is operating with a 6-strand wire rope that has the following broken wire count in the most damaged section: 3 broken wires in one lay length and 2 additional broken wires in the adjacent lay length. Under ASME B30.5, what is the removal determination?

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A. Total of 5 broken wires across 2 lay lengths — below the 6-wire threshold; the rope may continue in service with enhanced monitoring

B. The 3 broken wires in a single lay length is below the 6-wire threshold — continue in service

C. The concentration of 5 broken wires in two adjacent lay lengths indicates accelerating deterioration — remove from service

D. 3 broken wires in one lay length and 2 in the adjacent lay length do not individually or collectively meet any ASME B30.5 removal criterion — continue in service without restriction

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**53.** Under ASME B30.26, which of the following is a condition that requires a shackle to be removed from service?

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A. The shackle has been in service for more than 5 years regardless of condition

B. The shackle body shows a visible crack, the pin shows more than 10% wear from its original diameter, or the shackle has been subjected to a shock load or overload

C. The shackle's safety factor has been reduced by repeated use at above 80% of its working load limit

D. The shackle's screw pin has been replaced with a bolt of equivalent grade — mixed hardware requires removal

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**54.** A crane's anti-two-block device is tested during the pre-shift inspection and the alarm activates correctly but the automatic hoist stop function does not engage. What is required?

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A. The crane may operate using the alarm function only — the operator will manually stop the hoist when the alarm activates

B. Disable the alarm and use a physical block stop limit in its place — equivalent protection satisfies the ATB requirement

C. Remove the crane from service — the ATB device must provide both an alarm and an automatic hoist stop; failure of either function is a removal-from-service condition under OSHA 1926.1415

D. Recalibrate the automatic stop function during the shift — the crane may operate until calibration is complete if the operator monitors the block position manually

**55.** A rigger is building a rigging assembly using a wire rope sling in a choker hitch around a load with a smooth cylindrical surface. The choke angle is confirmed at 135 degrees. The sling's choker hitch rating is 9,600 lb. The load weighs 9,000 lb. Is this application acceptable?

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A. Yes — the choke angle of 135 degrees is above the 120-degree threshold where additional reduction applies; the sling's choker rating of 9,600 lb exceeds the 9,000 lb load; the application is acceptable

B. No — choker hitches require a minimum sling-to-load ratio of 1.5:1 regardless of choke angle

C. No — cylindrical surfaces require basket hitch configuration; choker hitches are prohibited on cylindrical loads

D. Yes — but only if the sling manufacturer confirms the 9,600 lb rating applies to smooth cylindrical contact surfaces

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**56.** Under OSHA 1926 Subpart CC, what is the employer's obligation when a crane sustains a structural failure during operations?

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A. Notify OSHA within 8 hours and submit a written incident report within 24 hours

B. Contact the crane manufacturer within 24 hours and implement the manufacturer's recommended corrective actions

C. Conduct an internal investigation and provide the findings to OSHA upon request

D. Remove the crane from service immediately, preserve the scene to the extent possible, and notify OSHA — the crane must not return to service until the cause of the structural failure is identified and corrected

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**57.** A rigger is preparing to use a synthetic web sling that has been stored in a tool box for 6 months. The tag is intact, the sling appears clean, and no damage is visible on the outer surface. What must occur before this sling is used?

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A. No additional action — a sling stored in an enclosed toolbox is protected from environmental degradation; the intact tag and clean surface confirm the sling is ready for use

B. The sling must be inspected before this use regardless of storage conditions — ASME B30.9 requires inspection before each use; a sling returning from storage must be confirmed free of damage, chemical exposure, or other degradation before being returned to active service

C. Perform a proof test at 150% of the sling's rated capacity before the first use after extended storage

D. The sling must be recertified by a qualified rigger after any storage period exceeding 3 months

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**58.** A crane's load block is found during inspection to have a sheave that is cracked through the flange — the crack runs from the rope groove outward to the sheave's outer edge. What is required?

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A. Monitor the crack at each pre-shift inspection — removal is required when the crack reaches the sheave bore

B. Apply epoxy filler to the crack and re-inspect after 10 operating hours

C. Remove the block from service — a cracked sheave is a structural failure in a load-carrying component; the crack will propagate under load and can cause sudden sheave separation; the block must not be used until the sheave is replaced and the assembly inspected

D. Reduce all picks to 75% of rated capacity — the partial crack reduces the sheave's structural capacity proportionally

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**59.** Under ASME B30.9, what is the required action when a wire rope sling is used in a temperature environment that exceeds the manufacturer's rated temperature range?

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A. The sling must be derated by 10% for every 50°F above the rated maximum temperature

B. The sling must be replaced with a chain sling — wire rope slings are prohibited in high-temperature applications above the rated range

C. Continue using the sling with enhanced monitoring — temperature effects on wire rope are gradual and monitoring detects degradation before failure

D. This is not something that can be addressed by derating alone — the sling manufacturer must confirm whether the sling is appropriate for the temperature environment; using a sling outside its rated temperature range without manufacturer confirmation is not permitted

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**60.** A crane operator observes that the jib tip sheave has a visible flat spot on its groove surface approximately 0.5 inches wide and 0.25 inches deep. What does this finding indicate and what is required?

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A. A flat spot of this size is within normal sheave wear tolerance — re-inspect at the next periodic inspection

B. A flat spot on the sheave groove surface can be repaired by grinding — grind to restore the groove profile and return to service

C. The sheave must be lubricated — flat spots develop when sheaves are not regularly lubricated and will round out under normal use

D. The flat spot indicates the sheave has been impacted or has worn unevenly — a damaged sheave groove damages the wire rope that runs through it; the sheave must be replaced and the rope inspected for damage at the contact point before the crane returns to service

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**61.** A crane is performing a pick when the operator notices the load is slowly rotating even though rotation-resistant rope is in use. What is the most likely cause and required action?

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A. No action — slow rotation under load is expected behavior with rotation-resistant rope; it indicates the rope's anti-rotation design is functioning correctly

B. Stop hoisting and assess the rotation — slow rotation with rotation-resistant rope may indicate the rope has been damaged, the terminations are contributing to torque, or the load's rigging geometry is inducing rotation; the cause must be identified before continuing

C. Increase hoist speed to bring the load above the rotation zone before the spin worsens

D. Apply a tagline to arrest the rotation and continue hoisting — tagline arrest is the standard response to load rotation regardless of rope type

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**62.** Under ASME B30.5, which of the following CORRECTLY describes the documentation requirement for a crane's periodic inspection?

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A. The periodic inspection must be documented on a form approved by OSHA or a nationally recognized testing laboratory

B. The lift director must countersign the periodic inspection record before the crane returns to service following inspection

C. The periodic inspection results must be documented and the records retained for the life of the equipment — no specific form is required but the records must capture the crane's condition at the time of inspection and be available for review

D. Periodic inspection records must be submitted to the crane manufacturer within 30 days of the inspection date

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**63.** A wire rope sling used in a basket hitch is found to have one broken wire at the point where the rope contacts the hook. Under ASME B30.9, what action is required?

A. Remove the sling from service — a broken wire at the contact point with the hook indicates high stress concentration at that location; the hook contact geometry may be creating a damaging D:d ratio condition; the sling must be removed and the contact geometry evaluated

B. Continue in service — one broken wire in a basket hitch is below the removal threshold for wire rope slings

C. Tape the broken wire down to prevent it from snagging on rigging hardware and continue in service

D. Use the sling only in vertical hitch configuration — vertical hitch avoids the contact point geometry that caused the wire break

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**64.** A crane's outrigger float is found during inspection to have a crack running completely through the float plate from one edge to the other. The crane is currently on outriggers supporting a load. What is required?

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A. Monitor the crack during the current pick — if the float does not move, complete the pick and remove the float before the next one

B. Remove the crane from service after the current pick is complete — the float may be used for the remaining lift but must be replaced before the next shift

C. Reduce all subsequent picks to 50% of rated capacity — the cracked float can support half its original rated load

D. Land the load at the nearest safe position using extreme care — the crane must not be repositioned or operated further until the cracked float is replaced; a crack through the entire float plate is a critical structural failure in the outrigger support system

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**65.** Under OSHA 1926 Subpart CC, what is the required qualification for a person who directs the assembly and disassembly of a lattice boom crane?

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A. Any certified crane operator with lattice boom experience may direct A&D — certification is the qualifying credential for all crane-related activities

B. A qualified person who has the knowledge, training, and experience necessary to direct A&D for the specific crane type — the qualification is type-specific; the A&D director must be familiar with the procedures, hazards, and requirements for the particular lattice boom crane being assembled

C. A licensed professional engineer must be present during all lattice boom crane assembly and disassembly operations

D. The crane manufacturer's representative must be present during the first A&D on any project — after the first assembly, a qualified person may direct subsequent assemblies

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**66.** A crane is operating at a site when the operator notices smoke coming from the engine compartment during a pick. The load is suspended at 20 feet of height. What is the correct sequence of actions?

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A. Complete the pick and then shut down — finishing the lift removes the load hazard before addressing the engine issue

B. Gradually lower the load to the ground while preparing to evacuate — a gradual descent is safer than an emergency stop

C. Land the load at the nearest safe position as quickly as safely possible, shut down the engine, sound the alarm, and evacuate — engine smoke indicates an active fire risk; personnel safety and load landing are the immediate priorities in that order

D. Shut down the engine immediately regardless of load position — stopping the engine eliminates the fire source; the load can be addressed after the engine is secured

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**DOMAIN 4: LOAD CHARTS**

**Questions 67–90**

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**67.** A crane's gross capacity at 22-foot radius with a 75-foot boom on full outriggers is 61,000 lb. The hook block weighs 1,250 lb. Three wire rope slings weigh 310 lb each. Five shackles weigh 42 lb each. The payload is 57,800 lb. What is the net capacity and can this lift proceed?

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A. Total deductions: block (1,250) + slings (3 × 310 = 930) + shackles (5 × 42 = 210) = 2,390 lb; net capacity = 61,000 − 2,390 = 58,610 lb; payload of 57,800 lb is within net capacity; the lift can proceed

B. Total deductions: block (1,250) + slings (930) = 2,180 lb; shackle weight is not deducted; net = 58,820 lb; lift proceeds

C. Total deductions = 2,390 lb; net = 58,610 lb; payload at 98.6% of net requires a critical lift plan before proceeding

D. Total deductions = 2,390 lb; net = 58,610 lb; but the lift requires certified payload weight before proceeding at this margin

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**68.** A crane's load chart shows 78,000 lb gross at 16-foot radius and 59,000 lb at 22-foot radius for the same 85-foot boom on full outriggers. The planned pick radius is 19 feet. Which capacity value governs?

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A. 78,000 lb — the 16-foot row governs because 19 feet is closer to 16 than to 22

B. 68,500 lb — the interpolated value between the two rows at the proportional midpoint

C. 59,000 lb — the 22-foot row value governs regardless of proximity to either row when the actual radius falls between two listed radii; the greater radius row is always used

D. Either value — the operator selects the more favorable row when the actual radius falls within 3 feet of either listed radius

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**69.** A crane is picking at 24-foot radius. Net capacity is 44,200 lb and total hook load is 41,800 lb — 94.6% of net. The set point is at 30-foot radius. The net capacity at 30 feet is 33,500 lb. Can this lift proceed as planned?

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A. Yes — confirming capacity at the pick radius is the primary requirement; the set radius is secondary

B. No — the total hook load of 41,800 lb exceeds the net capacity of 33,500 lb at the 30-foot set radius; the lift cannot proceed in this configuration; the crane must be repositioned or the load weight reduced before a pick at this radius combination is attempted

C. Yes — the operator confirms pick radius capacity and monitors the LMI during the swing; if the LMI approaches 100%, the operator stops before the set

D. Yes — the set point capacity is only binding if the crane cannot return the load to the pick point; since the pick point is confirmed, the set radius is advisory

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**70.** A crane's load chart note reads: "Capacities shown include the weight of a 1,200 lb hook block." The operator is using a 1,600 lb hook block. The gross capacity at the planned configuration is 48,000 lb. Rigging weighs 880 lb. The payload is 44,500 lb. What is the correct net capacity?

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A. Deduct block (1,600) + rigging (880) — standard deduction; net = 45,520 lb; lift proceeds

B. Deduct only rigging (880) — block is already in the chart; net = 47,120 lb; lift proceeds

C. The chart already deducted 1,200 lb for the standard block — the operator must additionally deduct the 400 lb difference because the actual block is heavier than the chart assumed; effective gross = 48,000 − 400 = 47,600 lb; deduct rigging (880); net = 46,720 lb; payload of 44,500 lb is within net capacity

D. Add the 1,200 lb chart block weight back to gross before deducting the actual block and rigging — effective gross = 49,200 lb; net = 47,320 lb; lift proceeds

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**71.** A crane is operating in the over-front directional configuration. The over-front chart shows 42,000 lb gross at 20-foot radius. The same configuration in the 360-degree chart shows 31,000 lb. After deducting block (1,100 lb) and rigging (760 lb), a pick at 37,500 lb payload requires 39,360 lb gross. Can this lift proceed in the over-front configuration?

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A. Yes — the over-front directional chart of 42,000 lb gross governs for a confirmed over-front pick; 39,360 lb gross required is within the 42,000 lb gross capacity; net capacity = 40,140 lb; payload of 37,500 lb is within net capacity

B. No — the 360-degree chart value of 31,000 lb always governs for picks near the front of the crane — directional charts are supplementary references only

C. Yes — the operator may use either chart value; the over-front chart is more favorable and its use is discretionary

D. No — directional chart values require lift director authorization before use

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**72.** A crane has a structural limit of 105,000 lb and a stability limit of 128,000 lb at 15-foot radius with a 60-foot boom on full outriggers. The planned total hook load is 98,000 lb. Which value is the rated capacity and can the lift proceed?

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A. Stability limit of 128,000 lb is the rated capacity — 98,000 lb is within capacity; lift proceeds

B. Average of both limits — 116,500 lb is the rated capacity; 98,000 lb is within; lift proceeds

C. The structural limit governs at short radii — 98,000 lb is within the structural limit; additionally, confirming the crane configuration exactly matches the structural limit specification is required before proceeding

D. The structural limit of 105,000 lb is the rated capacity — it is the lower of the two limits; 98,000 lb is within capacity; the lift can proceed

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**73.** A crane is performing a pick at 28-foot radius. After the pick, the operator repositions the crane 3 feet closer to the load, reducing the planned set radius from 28 to 25 feet. The original capacity check was performed at 28 feet. What must the operator confirm before setting the load at 25 feet?

---

A. No additional confirmation — a shorter radius always means more capacity; if the pick at 28 feet was within capacity, the set at 25 feet is automatically within capacity for the same hook load

B. The operator must verify the crane did not go out of level during the reposition and that all outrigger conditions remain confirmed before using the capacity confirmed at any prior radius

C. Contact the lift director to confirm the new set radius is within the approved lift plan before setting

D. The 3-foot reposition is within the 10% radius adjustment tolerance — no additional confirmation is required

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**74.** A crane is configured with a 95-foot boom. The load chart shows the following gross capacities at 35-foot radius: 95-foot boom — 28,500 lb; 80-foot boom — 33,000 lb; 65-foot boom — 39,000 lb. A pick requires 26,000 lb net capacity. Block weighs 1,050 lb and rigging weighs 820 lb. Which chart section governs?

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A. The 65-foot boom section — it provides the most capacity at this radius

B. The 80-foot boom section — it provides more capacity than the installed boom and is conservative

C. The 95-foot boom section — the installed boom length always governs; gross = 28,500 lb; deductions = 1,870 lb; net = 26,630 lb; required net of 26,000 lb is within net capacity; the lift can proceed

D. The operator may choose any boom length section as long as the required net capacity is within the selected section's values

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**75.** A crane operator confirms the total hook load is 89% of gross rated capacity before a pick. The gross capacity at the configuration is 54,000 lb. What is the minimum total hook load that would trigger critical lift requirements for this pick?

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A. 40,500 lb — 75% of 54,000 lb gross capacity is the critical lift threshold; the current total hook load must be compared to this threshold to confirm whether a critical lift plan is required

B. 40,500 lb is the threshold but the current total hook load is 54,000 × 0.89 = 48,060 lb which exceeds the threshold — a critical lift plan is required for this pick

C. 45,900 lb — 85% of gross capacity is the critical lift threshold under OSHA 1926 Subpart CC

D. The critical lift threshold is based on net capacity, not gross — calculate 75% of net capacity to determine whether a critical lift plan is required

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**76.** A crane is operating with 25% outrigger extension. The 25% extension chart shows 21,000 lb gross at 18-foot radius. Before the next pick, the operator wants to extend to full outriggers for additional capacity. The full extension chart shows 38,000 lb gross at the same radius. The load is currently on the ground. What is the correct sequence for this configuration change?

---

A. Extend the outriggers to full while the load is rigged and ready — this saves time before the pick

B. Notify the lift director of the configuration change and proceed — lift director authorization is the only requirement for outrigger extension changes between picks

C. Extend all outriggers to full extension with the load on the ground, re-level the crane within the manufacturer's tolerance, confirm all tires are off the ground, and verify the full extension chart section applies before picking

D. Extend the outriggers to full, pick the load, and then re-level if the LMI shows a discrepancy — re-leveling under load is acceptable for minor configuration adjustments

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**77.** A tandem lift has Crane A assigned 60% and Crane B assigned 40% of the total load. Total load including all rigging is 124,000 lb. Crane A's net capacity at its configuration is 77,000 lb. Crane B's net capacity is 51,000 lb. Are both cranes within their individual net capacities?

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A. No — Crane A's 60% share is 74,400 lb which is within its 77,000 lb net capacity; Crane B's 40% share is 49,600 lb which is within its 51,000 lb net capacity; both are within capacity but Crane B has only 1,400 lb margin — additional engineering review of load sharing accuracy is warranted

B. Yes — Crane A carries 74,400 lb within 77,000 lb net; Crane B carries 49,600 lb within 51,000 lb net; both cranes are within their individual capacities and the lift can proceed as planned

C. No — equal load sharing is required for all tandem lifts; a 60/40 distribution is not compliant

D. No — Crane B's share of 49,600 lb exceeds the 48,960 lb maximum for a crane with 51,000 lb net capacity under the OSHA 96% tandem lift limit

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**78.** A crane's load chart note states: "Ratings apply to freely suspended loads on firm level ground with all outriggers fully extended." The crane is set up on a 0.8% slope — within the manufacturer's 1% leveling tolerance — on full outriggers. Does the note restrict operations?

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A. Yes — the note requires level ground; a 0.8% slope is not level and the chart ratings do not apply

B. No — the note's "firm level ground" condition is met when the crane is leveled within the manufacturer's tolerance; a crane leveled to within 1% on a 0.8% slope meets the note's condition

C. The note is advisory — it does not restrict operations when the crane is leveled within manufacturer's tolerance

D. Contact the manufacturer for clarification — slope tolerance interpretation requires manufacturer confirmation before operating on any non-zero grade

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**79.** A crane has confirmed net capacity of 39,000 lb at 26-foot radius. The total hook load is 36,800 lb. During the swing, the boom tip deflects and the radius temporarily increases to 29 feet. The chart at 29 feet shows 33,200 lb net capacity. The total hook load exceeds net capacity at 29 feet. What must happen?

---

A. Stop all crane movement — the load moment has exceeded rated capacity at the actual operating radius; this is a rated capacity exceedance event regardless of the cause; the load must be landed safely and a post-incident inspection completed before the crane returns to service

B. Increase the boom angle quickly to reduce the radius back to 26 feet — the exceedance is brief and correctable by boom angle adjustment

C. Continue at reduced swing speed — the 29-foot exceedance is a transient boom deflection condition that resolves when the swing stops

D. Document the boom deflection and complete the set — deflection-induced radius increases are recorded but do not trigger post-incident inspection requirements

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**80.** A crane's load chart shows a maximum rated radius of 48 feet for the current 80-foot boom configuration. A pick at 45-foot radius and a set at 48-foot radius are planned. The boom deflects under load and the actual radius at the set point reaches 50 feet. What is the consequence?

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A. A 2-foot exceedance from deflection is within the structural engineer's deflection tolerance and does not constitute a rated capacity violation

B. Boom deflection at maximum radius is an expected condition — the load chart accounts for deflection in its maximum radius specification

C. Document the deflection for the manufacturer's review and complete the set — the chart's maximum radius specification includes a 5% deflection allowance

D. The crane operated beyond its maximum rated radius — this is a rated capacity exceedance event requiring a stop-work, safe load landing, and post-incident inspection before the crane returns to service

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**81.** A crane's load chart shows the following gross capacities at 20-foot radius: on rubber 24,000 lb; 50% outrigger extension 35,000 lb; full extension 52,000 lb. The crane is confirmed on full outriggers. Block

weighs 1,100 lb, rigging weighs 840 lb. The payload is 48,500 lb. What is the net capacity and can this lift proceed?

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A. Full extension chart applies — gross 52,000 lb; deductions: block (1,100) + rigging (840) = 1,940 lb; net = 50,060 lb; payload of 48,500 lb is within net capacity; the lift can proceed

B. Full extension chart applies — net = 50,060 lb; but the payload at 96.9% of net requires certified weight verification before proceeding

C. On rubber chart of 24,000 lb governs — it is the most conservative value

D. 50% extension chart applies when the crane is between extension positions

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**82.** A crane operator is planning a series of picks ranging from 18 to 25-foot radius. The hook load varies between 28,000 and 34,000 lb across the series. Why is confirming capacity at the maximum planned radius insufficient for this series?

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A. Confirming at the maximum radius is not sufficient — because the hook load varies across the series, each different load must be confirmed within net capacity at the specific radius where it will be picked; a heavier load at a shorter radius may still be within capacity, but a lighter load at the maximum radius does not validate a heavier load at any radius

B. Confirming at the maximum radius is sufficient for any series of picks — the maximum radius confirmation is always the conservative approach regardless of hook load variation

C. Confirming at both the minimum and maximum radii brackets the series — all intermediate radii are automatically confirmed

D. The varying hook load requires a new LMI calibration before each pick in the series

---

**83.** A crane's load chart shows that gross capacity decreases from 71,000 lb at 18-foot radius to 43,000 lb at 26-foot radius — a 39% decrease over 8 feet. An operator plans a pick at 22-foot radius and estimates the capacity as approximately 57,000 lb by linear interpolation. What is the error in this approach?

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A. Load chart capacity curves are not linear — interpolation between chart rows is not a recognized methodology; the 26-foot row value of 43,000 lb governs any pick between 18 and 26 feet; the operator must use 43,000 lb as the gross capacity for the 22-foot pick

B. Linear interpolation is acceptable for planning purposes but not for actual picks — the operator must confirm the actual chart value before lifting

C. The interpolated value of 57,000 lb is acceptable within a 10% planning tolerance

D. Interpolation is only acceptable when the radius falls within 2 feet of a listed chart row

---

**84.** A crane is performing a critical lift when the lift director discovers the total hook load was calculated incorrectly — the actual total hook load is 4,200 lb heavier than the approved lift plan stated. The load is currently on the ground being rigged. What must happen before the pick proceeds?

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A. The lift director may authorize the pick at the revised weight — the lift director has authority to approve field modifications to critical lift parameters

B. The pick may proceed if the corrected total hook load is still within net capacity — a documentation update is made after the lift

C. The operator may proceed at the discretion of the site safety officer — safety officer authorization covers field revisions to lift plan parameters

D. The critical lift plan must be revised to reflect the actual hook load, the corrected load must be confirmed within net capacity at all planned radii, and all involved personnel must be re-briefed before the pick proceeds

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**85.** A crane is picking a load that requires the operator to pick at 20-foot radius and swing 90 degrees to set at 20-foot radius. The same chart value governs both positions. The swing path passes through a maximum radius of 24 feet at the midpoint of the swing. The chart at 24 feet shows 15,000 lb lower gross capacity than at 20 feet. The total hook load is 8,000 lb below the 20-foot gross capacity. What must the operator confirm before proceeding?

---

A. No additional confirmation — pick and set at the same radius with the same chart value means the lift is confirmed at both critical positions

B. The total hook load must also be confirmed within net capacity at the maximum swing radius of 24 feet — if the 8,000 lb margin at 20 feet is less than the 15,000 lb capacity reduction at 24 feet, the load exceeds net capacity during the swing

C. The swing path radius exceedance is within the 15% operational tolerance for arc swing geometry

D. The midpoint radius only requires confirmation for swings exceeding 180 degrees

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**86.** A crane is configured with a 70-foot boom and a 20-foot fixed jib. The jib tip load chart shows a maximum rated capacity of 6,800 lb at 62-foot tip radius. Block weight is 380 lb and rigging weighs 290 lb. The payload is 6,000 lb. What is the net capacity and can this lift proceed?

A. No — block (380) + rigging (290) = 670 lb deductions; net = 6,130 lb; payload of 6,000 lb is within net capacity; the lift can proceed with confirmed payload weight and radius

B. No — block and rigging deductions are not applied to jib tip chart values; the 6,800 lb gross equals 6,800 lb net; the lift can proceed

C. No — the payload of 6,000 lb is too close to the 6,800 lb gross capacity to proceed without a critical lift plan

D. No — jib tip picks require a minimum 20% capacity margin; 6,000 lb is only 11.8% below gross capacity

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**87.** A crane is performing a pick at 93% of net capacity. The operator pre-confirms the total hook load, operating radius, and configuration. During the pick, no unusual conditions are observed. The LMI reads 94% at working height. What does the 1-point LMI discrepancy most likely indicate and is action required?

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A. The 1-point discrepancy between the pre-lift calculation and the LMI reading at working height most likely reflects minor boom deflection increasing the actual radius slightly — the LMI reading is higher than calculated because the actual radius is marginally greater than measured; the operator should note the reading and investigate whether the boom deflection has increased the radius materially before additional picks at this configuration

B. A 1-point LMI discrepancy at working height is within the instrument's field accuracy tolerance — no action required

C. The 1-point discrepancy indicates the pre-lift calculation was incorrect — recalculate before the next pick

D. The LMI requires recalibration — a 1% deviation from the pre-lift calculation triggers the calibration protocol under ASME B30.5

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**88.** A crane's on-rubber load chart shows 18,500 lb gross at 24-foot radius. The full outrigger chart shows 41,000 lb at the same radius. A time-sensitive pick requires 28,000 lb net capacity and there is no time to extend outriggers. The total hook load is 30,500 lb. Can the pick proceed on rubber?

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A. Yes — emergency time pressure authorizes use of the full outrigger chart when the full outrigger setup cannot be completed in the available time

B. Yes — the lift director may authorize the on-rubber pick at the full outrigger chart value when time constraints prevent full outrigger setup

C. Yes — the full outrigger chart value is available to any configuration when the required load is below 75% of the outrigger chart value

D. No — the total hook load of 30,500 lb exceeds the on-rubber gross capacity of 18,500 lb; the crane cannot safely lift this load on rubber; there is no time-pressure exception to the load chart; outriggers must be extended or the pick must be deferred

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**89.** A crane operator has been picking a series of identical loads at 22-foot radius throughout the day. On the 15th pick, the LMI reads 6% higher than the first 14 picks with the same load and rigging. The crane has not been repositioned. What must the operator investigate?

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A. A 6% LMI increase on an identical pick after 14 consistent readings indicates something in the crane's configuration or ground conditions has changed — most likely the operating radius has increased from outrigger settling or the crane has gone slightly out of level; the radius and outrigger conditions must be re-measured and re-confirmed before continuing

B. A 6% variation over 15 identical picks is within normal LMI field drift — continue the series

C. The LMI requires recalibration — any drift above 5% over a series of identical picks triggers the recalibration protocol

D. Re-weigh the load — a 6% LMI increase indicates the load has gained weight from environmental factors such as moisture absorption

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**90.** A crane operator completes a pre-lift check confirming the total hook load is 82% of gross capacity at 28-foot radius. The lift director then directs the operator to pick from a different location that requires a 34-foot radius. No new capacity check is performed and the operator proceeds. What is the error and what should have happened?

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A. The error is that the lift director changed the pick location without updating the lift plan — the lift director's error is the only issue; the operator followed a valid directive

B. The error is that the operator did not re-measure the radius before picking — measuring is required but the prior chart confirmation is valid for any nearby radius

C. The operator used a capacity confirmed at 28-foot radius for a pick at 34-foot radius — these are different configurations with different rated capacities; the operator must look up gross capacity at 34 feet, apply all deductions, and confirm the total hook load is within net capacity at 34 feet before picking; the 28-foot confirmation is not transferable to any other radius

D. The error is documentation — the pick location change must be documented before proceeding; once documented, the prior capacity check remains valid

## Answer Key And Explanations

**1. B** — Uncontrolled fill placed without compaction testing has unpredictable bearing capacity. Fill can contain voids, soft zones, debris, and poorly bonded layers that create non-uniform and potentially very low support conditions. Five years of time does not consolidate uncontrolled fill to the predictability of native soil. A geotechnical engineer must evaluate the bearing capacity before crane setup.

**2. C** — A storm drain inlet grate covers a pipe, junction box, or catch basin beneath the surface. The grate itself may appear intact but the structure beneath it — and the pipe leading away from it — may not be rated to support concentrated crane outrigger loads. The entire storm drain system beneath the planned outrigger position must be evaluated for structural capacity before the crane is placed over it.

**3. A** — OSHA 1926.1402 requires the controlling entity to provide all available information about ground conditions including underground utility locations, known or suspected subsurface conditions, and the proximity of structures that could affect crane operations. The regulation does not require a licensed engineer's certification, all historical soil reports, or a safety officer's lift plan approval.

**4. D** — A sinkhole is evidence of active subsurface void development. Once a void reaches the surface, the surrounding ground is compromised — the void did not form in isolation and additional voids or weakened zones likely exist in the surrounding area. A sinkhole 25 feet from an outrigger can propagate toward the crane's support area rapidly. The load must be landed and the crane moved away before investigating.

**5. B** — A 4-inch gas distribution line at 30-inch depth is a pressurized pipeline that has no structural design requirement for crane travel loads. The pipe's wall thickness and bedding material may or may not be adequate to support the crane's ground bearing pressure. The utility owner or a qualified engineer must confirm the line's structural capacity before the crane crosses it.

**6. D** — No OSHA regulation or ASME standard provides a universal minimum setback distance from an excavation edge for crane outrigger loads. The required setback is determined by calculating the effect of the outrigger load on the trench wall's stability — a function of soil type, trench geometry, outrigger load magnitude, and setback distance. This is a competent person evaluation, not a distance-rule compliance check.

**7. A** — Asphalt bearing capacity is temperature-dependent. At high surface temperatures from direct sun, the asphalt binder softens and the pavement's ability to distribute and resist concentrated loads decreases significantly. A morning inspection at 72°F does not confirm adequacy at 105°F surface temperature. Outrigger conditions must be re-evaluated before afternoon picks on hot asphalt.

**8. D** — The 15-foot setback specified in the geotechnical report is an engineering determination based on the wall's geometry, the soil's properties, and the crane's outrigger loads. The geotechnical engineer calculated that 15 feet provides an adequate factor of safety against wall failure from the combined soil

pressure and crane surcharge. A 3-foot reduction changes this factor of safety in an unknown direction. Only the geotechnical engineer can determine whether the 12-foot position is acceptable.

**9. B** — A crack that develops in a concrete pier deck near an outrigger position during operations is an indicator that the deck may be reaching its structural capacity at that location. The crack was not present at setup and has developed under load — this is a warning of progressive structural distress. The load must be landed immediately and a structural engineer must evaluate the pier before any further lifting.

**10. C** — Marine crane operations introduce unique stability considerations that do not exist on land. List, trim, wave action, and barge loading changes all affect the crane's effective levelness and stability geometry. The barge or vessel must be stable and the crane must be operated in a manner that accounts for these marine-specific conditions. OSHA does not mandate a 15% derating, a Coast Guard endorsement, or a surveyor's presence.

**11. B** — Extended storage of heavy materials applies sustained load to the soil beneath. When the load is removed, the soil may have residual settlement, disturbed structure, or compacted zones with uneven bearing characteristics. Six months of steel storage can create soil conditions significantly different from the surrounding undisturbed area. The operator must evaluate crane travel stability over this area before crossing.

**12. D** — Active dewatering lowers the groundwater table in the surrounding soil. In fine-grained soils — silts and clays — lowering the water table increases the effective stress in the soil, which causes consolidation settlement. Settlement that begins during dewatering operations and progresses over hours confirms active consolidation is occurring beneath the crane's outrigger. This is not normal behavior and must be evaluated before operations continue.

**13. B** — A site superintendent's subjective description of ground conditions as "good hard ground" does not constitute verified ground condition information under OSHA 1926.1402. The regulation requires the controlling entity to provide actual information about ground conditions — not a qualitative assessment. The operator is not obligated to proceed without verified information and proceeding on a percentage reduction does not substitute for actual ground data.

**14. C** — The primary concern with a fresh concrete foundation pour adjacent to the outrigger area is that the foundation excavation and the pour sequence may have removed or disturbed the lateral soil support that the adjacent outrigger is bearing on. Excavating adjacent to an existing soil mass removes lateral confinement, which can reduce bearing capacity and create a risk of lateral sliding toward the excavation.

**15. A** — OSHA 1926.1409 Table A uses a formula-based approach for lines rated between 50 kV and 350 kV: 10 feet plus 0.4 inches per kV above 50 kV. For a 200 kV line: 200 − 50 = 150 kV above baseline × 0.4 inches = 60 inches = 5 feet additional. Total minimum = 10 + 5 = 15 feet. This formula-based approach produces distances that vary with the specific voltage, not flat minimums by voltage bracket.

**16. D** — An overnight water main break released a significant volume of water into the soil. Even after repair, the water that escaped has infiltrated the surrounding soil and may have saturated the zone between the break location and the crane's outrigger positions. Saturated fine-grained soils can have dramatically reduced bearing capacity. The right-front outrigger area must be specifically evaluated for saturation before resuming picks.

**17. B** — The manufacturer's slope limit applies to the underlying ground grade — not to the leveled position of the crane. The slope limit exists because slopes create unequal outrigger reactions, affect stability geometry, and can cause the crane to slide on the slope surface. Using outrigger cylinders to level the crane on a slope steeper than the manufacturer's limit does not address these structural and stability concerns. The underlying slope exceeds the 1% limit and engineering evaluation is required.

**18. C** — Abandoned mine workings at 40-foot depth create large subsurface voids. The stability of the ground above these voids depends on the thickness and quality of the overburden, the void geometry, and the applied loads. A 20-foot wide, 8-foot high abandoned room at 40-foot depth represents a significant void that may not be stable under crane outrigger loads. A geotechnical engineer with mine subsidence experience must evaluate this risk before operations begin.

**19. A** — A load that is still swinging after being set represents an active hazard — the load can shift or topple, and the swing path extends beyond the immediate set location. Beginning a new pick cycle while the previous load is still in motion creates dual hazards in the same operational area. Both the previous set area and the new pick area must be confirmed stable and clear before the next pick begins.

**20. D** — OSHA 1926.1412 requires all crane functions to be tested with no load before the first pick of each shift. This includes hoist, boom, swing, and travel functions, as well as all limit switches and safety devices. Proof testing the load line, physically driving to limit positions, and LMI calibration with a reference weight are not regulatory requirements of the pre-shift inspection.

**21. B** — Loss of radio communication with a load at working height is a stop-work condition. The operator and signal person must have reliable communication throughout all lifting operations under OSHA 1926 Subpart CC. Hand signals as an automatic fallback are not established protocol under all circumstances — the agreed communication method failed and must be restored. The load holds at its current position while the signal person retrieves the backup radio.

**22. C** — A shipping manifest reflects the weight of the product as shipped by the vendor. It may not include the weight of packaging materials, shipping skids, attached hardware, or other materials that are part of the total payload as rigged at the job site. The operator must confirm the manifest weight represents the complete payload including all materials that will be lifted before treating the manifest figure as the confirmed hook load.

**23. A** — Rope contact with any structural component other than the sheave groove causes abrasive wire damage to the rope at the contact point and indicates a reeving or sheave alignment problem. Continued hoisting against a structural contact progressively damages the rope in a localized zone. The load must be lowered immediately, the reeving and sheave alignment inspected, and the problem corrected before any further picks.

**24. D** — OSHA 1926.1417 requires the applicable load chart to be physically present in the cab and accessible to the operator during all crane operations. The load chart is the governing document for all capacity decisions. Operating without the load chart — regardless of memory, similar model references, or verbal confirmations — is a direct regulatory violation and must not occur.

**25. B** — Two cranes operating in proximity without a documented interaction plan creates an immediate collision risk. A boom-to-boom or boom-to-load contact between two cranes can cause catastrophic

structural failure of both machines. When the operator observes another crane's load path encroaching on their own boom tip area, all functions must stop immediately and both lift directors must resolve the interaction plan before either crane resumes movement.

**26. C** — Any downward movement of a suspended load without operator input is evidence that the hoist brake is not holding the load statically. At 88% of net capacity, the load is substantial and a brake that is drifting under static load will not improve under further use. The load must be landed at the nearest safe position immediately. Re-engaging the control to stop the drift masks the deficiency without resolving it.

**27. A** — The pre-shift inspection must be performed before the first lift of each new shift regardless of what was inspected at the end of the previous shift. Overnight periods expose the crane to weather changes, temperature cycling, unauthorized access, and environmental conditions that may have altered its condition. The previous shift's inspection does not capture these overnight changes.

**28. D** — When the swing function stops responding mid-lift with a suspended load, the priority is to safely manage the load. The hoist function can lower the load to the nearest safe landing without requiring swing movement. Attempting to force swing movement without confirmed hydraulic function can cause additional system damage. Using the boom hoist to reposition the load by changing boom angle is not an appropriate substitute for the swing function.

**29. B** — Personnel are never permitted on a suspended load under any circumstances. This is an unconditional stop condition under OSHA 1926 Subpart CC. No signal, lift director authorization, or productivity consideration changes this requirement. All crane movement must stop immediately when any person is observed on a suspended load.

**30. C** — Disorganized drum spooling causes the rope to be crushed between crossing wraps during re-hoist. The crossover points create concentrated loads that flatten and damage the rope's internal structure at those locations. The crane must not re-hoist until the rope is properly respooled. Completing the lower does not address the rope damage that will occur during re-hoist from an improperly spooled drum.

**31. A** — OSHA 1926.1417 is unconditional — an operator may not leave the cab while a load is suspended under any circumstance. There is no exception for lift director physical control, brief absences, or proximity to the set surface. The load must be fully landed and all rigging tension released before the operator may exit the cab.

**32. D** — After a stop signal has been received and communication cannot be restored after 3 minutes, the operator must hold position and continue attempting to reach the signal person. The stop signal is the last valid instruction received. Moving in any direction without a valid signal — including lowering the load — constitutes acting without authorization. The load holds until communication is restored or the signal person returns.

**33. B** — A developing hydraulic leak at a boom hoist cylinder is a deficiency that must be reported to maintenance before the crane is operated further. Hydraulic cylinder leaks can progress suddenly from slow to catastrophic. The rate at the end of one shift does not predict the rate at the start of the next. The crane must not operate with an unresolved hydraulic cylinder leak regardless of the current rate.

**34. C** — The operator's direct observation of apparently incomplete rigging is an independent safety concern that overrides any signal received. Applying tension to rigging that may have only one of four planned legs attached could cause the load to drop or tilt catastrophically. All crane functions must stop until the rigging is physically inspected and confirmed complete by the rigging crew.

**35. A** — When a crane contacts an energized line, the crane structure is energized at line voltage. The operator inside the cab is protected by the cab's isolation from ground. Exiting the cab places the operator at risk of completing a circuit to ground — the step-potential gradient around an energized crane can be lethal at significant distances from the machine. The operator must stay in the cab, avoid touching metal, sound the horn, and call for emergency services.

**36. D** — A tandem lift requires continuous coordinated direction from the lift director with confirmed communication to all cranes. When Crane B's operator cannot be reached, the coordination essential to tandem lift safety no longer exists. Crane A cannot safely continue based on visual observation of Crane B's movements — the movements may not reflect the operator's intended response to the load's behavior. All movement stops until communication is restored.

**37. B** — OSHA 1926.1431 requires a trial lift with a test weight equal to the platform's rated capacity, followed by a visual inspection of the platform for structural distress, followed by a pre-lift meeting with all personnel involved before anyone boards. All three elements are mandatory and sequential. Dedicated crane requirements, signed acknowledgments, and third-party inspection certificates are not the regulatory requirements stated in 1926.1431.

**38. C** — Involuntary control input errors — applying the wrong function without intention — are a recognized indicator of cognitive fatigue that constitutes operator impairment under OSHA 1926.1417. The fact that the operator is catching these errors means they are still functional enough to self-monitor, but the underlying error generation indicates the cognitive load of operating safely is exceeding the operator's current capacity. The operator must stop and notify the supervisor.

**39. A** — A load line angle at lift-off without any horizontal movement of the load indicates the load is constrained below — something is preventing it from moving to a position directly below the hook. The load may be pinned under adjacent material, hooked on embedded reinforcement, or physically attached to something beneath grade. Hoisting against a constrained load builds tension in the line and rigging beyond what the LMI registers. All functions must stop immediately.

**40. D** — A 4-inch total clearance between a 3-foot-8-inch load and a 4-foot opening leaves no margin for load swing, line angle, or rigging geometry. A dedicated signal person with direct visual contact of both the load and the opening throughout the entire lower is essential — the operator cannot see the clearance condition from the cab and must rely entirely on the signal person's guidance to prevent contact between the load and the opening.

**41. B** — A reeving change from 3 to 5 parts of line affects the load chart section that applies, the drum capacity requirements, the maximum single-line pull available, and the LMI's configuration inputs. The operator must confirm the new drum capacity is adequate for 5-part reeving, identify and verify the applicable load chart section for the new reeving, and confirm the reeving change was made correctly before any pick is attempted.

**42. C** — Load chart accuracy verification against manufacturer specifications is not a required item for the frequent inspection under ASME B30.5. The frequent inspection covers physical condition items — wire rope, hook, safety devices, controls, structural components, and fluid levels. The load chart's accuracy is confirmed when the chart is obtained from the crane manufacturer, not re-verified at each pre-shift.

**43. A** — At 25% outer wire wear, the sling is approaching the ASME B30.9 removal threshold of one-third (33%) outer wire diameter loss. While 25% does not independently trigger mandatory removal, a qualified person must evaluate whether the wear at this level — combined with the planned application — has reduced the sling's effective capacity below what is required. Enhanced monitoring and professional assessment are required at this wear level.

**44. D** — Any deformation of a boom structural member is a removal-from-service condition under ASME B30.5. A bent diagonal lacing member indicates the boom has experienced forces that exceeded the member's elastic limit — the member has permanently deformed. This means forces in the boom structure reached levels that may have also stressed other members, connections, or chords beyond their design limits. A qualified engineer must evaluate the full extent of the damage.

**45. B** — ASME B30.9 identifies 30 degrees from horizontal as the recommended minimum sling angle for wire rope slings. Below this angle the tension factor — 1/sin(angle) — increases steeply, potentially exceeding the sling's rated capacity at load weights that appear manageable. Below 30 degrees, engineering evaluation of the actual leg tension is required to confirm the sling is rated for the actual force it must carry.

**46. C** — A rated capacity limiter activation during a pick means the actual load moment has reached the device's trigger threshold — at or near rated capacity. The load must be set down and all inputs verified: actual hook load, operating radius, and crane configuration. Resetting and continuing treats the activation as a malfunction when it is functioning exactly as designed — as a protective intervention.

**47. A** — OSHA 1926 Subpart CC defines a qualified rigger as a person who, by recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience, has demonstrated the ability to solve or resolve rigging problems. The qualification is task-specific — it must be confirmed for the type of rigging being performed. No specific certification, course completion, or safety officer designation is required by the regulation.

**48. D** — A strand that has unwound from the rope body and is standing away as a loop has experienced severe internal structural failure. The rope's internal geometry has collapsed at that location. The protruding strand cannot be reseated without leaving residual damage — the wires at the unlay point are permanently deformed and the load path through that section is compromised. Immediate removal from service is required.

**49. B** — NCCCO administers separate certification examinations for Lattice Boom Truck (LBT) and Lattice Boom Crawler (LBC) crane types. These are distinct categories with different operating characteristics, travel systems, and setup procedures. OSHA 1926.1427 requires qualification specific to the crane type being operated. An LBT certification does not cover LBC operations regardless of the operational similarities between lattice boom crane types.

**50. C** — Surface rust covering more than 50% of the hook body is not listed as a mandatory removal criterion under ASME B30.10. The mandatory removal conditions are: any visible crack, throat opening increase of 15% or more from original specification, and twist of more than 10 degrees from the hook's original plane. Surface rust warrants inspection for underlying damage but is not itself a mandatory removal condition.

**51. A** — A swivel bearing that does not rotate freely transmits torque from the load directly to the load line during picks. This accelerates rope wear at the drum and sheaves, and can cause uncontrolled load rotation as the rope's natural torque is no longer absorbed by the swivel. The block must be serviced to restore swivel function before returning to service. Lubrication alone is not the answer — the bearing stiffness indicates internal wear beyond what lubrication resolves.

**52. D** — Three broken wires in one lay length is below the 6-wire per lay length removal threshold for 6-strand rope under ASME B30.5. Two broken wires in the adjacent lay length does not combine with the three in the first lay length to create a removal condition — each lay length is evaluated independently. Neither lay length individually or collectively meets a numerical removal criterion. However, the concentration and proximity warrant professional assessment and enhanced monitoring.

**53. B** — ASME B30.26 removal criteria for shackles include: visible cracks in the body or pin, pin wear exceeding 10% of the original pin diameter, evidence of having been subjected to a shock load or overload, and deformation. Service life, frequency of high-load use, and mixed hardware from pin replacement are not ASME B30.26 removal criteria.

**54. C** — OSHA 1926.1415 requires the ATB device to provide both an alarm and an automatic hoist stop function. Both are required — neither substitutes for the other. A device that alarms but does not automatically stop the hoist has failed half of its required function. The crane must be removed from service until both the alarm and the automatic stop are confirmed operational.

**55. A** — The choke angle of 135 degrees is above the 120-degree threshold below which additional capacity reduction applies. The sling's choker hitch rating of 9,600 lb governs this configuration and exceeds the 9,000 lb load. No additional reduction applies at 135 degrees. The application is acceptable provided the rigging geometry is confirmed and the choke angle is maintained during the lift.

**56. D** — OSHA 1926 Subpart CC requires the crane to be removed from service immediately following a structural failure and the scene preserved to the extent possible. OSHA must be notified. The crane must not return to service until the cause of the structural failure is identified and corrected. The 8-hour notification timeline, manufacturer-directed corrective actions, and internal investigation findings are not the primary regulatory response requirements.

**57. B** — ASME B30.9 requires synthetic web slings to be inspected before each use — not each shift, not each week, and not each storage period. A sling returning from 6 months of storage must be inspected before its first use after that storage period. Storage conditions can introduce chemical exposure, UV damage, rodent damage, or moisture-related degradation that is not apparent without close inspection.

**58. C** — A cracked sheave flange is a structural failure. The sheave transmits the full load line force through its flange and bore to the block cheek plates. A crack running from the rope groove outward will propagate under the cyclic loading of each pick until the flange section separates. Sheave separation under

load can cause sudden loss of rope support and load drop. The block must be removed from service immediately.

**59. A** — Using a sling outside its manufacturer's rated temperature range without manufacturer confirmation is not permitted under ASME B30.9. Temperature affects wire rope lubrication, wire ductility, and core integrity in ways that the standard rating does not account for. The manufacturer must confirm whether the sling is appropriate for the specific temperature environment before it is used outside the rated range.

**60. D** — A flat spot on a sheave groove surface indicates the sheave has been impacted by a foreign object, has experienced rope jump and re-entry, or has developed uneven wear. A flat spot in the groove creates a point of concentrated rope contact that damages individual wires at the flat zone with every pick. The sheave must be replaced and the rope inspected for wire damage at the contact point before the crane returns to service.

**61. B** — Rotation-resistant rope is designed to minimize torque transmission under load. Slow rotation with this rope type indicates either rope damage that has disrupted the anti-rotation balance, a termination that is contributing to torque, or a rigging geometry that is inducing rotation through the attachment point. The cause must be identified — continuing to hoist while the rope or termination may be damaged is not acceptable.

**62. C** — ASME B30.5 requires periodic inspection results to be documented and records retained for the life of the equipment. No specific form is mandated by the standard. No OSHA-approved form, lift director countersignature, or manufacturer submission is required. The records must capture the crane's condition at the time of inspection and be available for review throughout the crane's service life.

**63. A** — A broken wire at the point of hook contact indicates the D:d ratio at the hook contact is causing damaging bending stress in the wire at that location. Hook geometry creates a concentrated contact point that may be sharper than the sling manufacturer's minimum D:d ratio. The sling must be removed from service and the hook contact geometry evaluated. Continuing in any configuration does not address the damaging contact condition.

**64. D** — A crack running completely through an outrigger float plate is a critical structural failure. The float is the sole interface between the outrigger cylinder and the ground — its structural integrity is essential to the crane's support. A fully cracked float can separate under load, causing sudden loss of support at that outrigger and potential crane overturn. The load must be landed with extreme care and the crane must not be operated further until the float is replaced.

**65. B** — OSHA 1926.1403 requires assembly and disassembly to be directed by a qualified person with knowledge, training, and experience specific to the crane type being assembled. This is a type-specific qualification — a person qualified to direct A&D on one crane type may not be qualified for another. A licensed engineer is not required to be present, and a manufacturer's representative is not required after the first assembly.

**66. C** — Engine smoke with a load at working height creates competing priorities. The correct sequence is: land the load at the nearest safe position as quickly as safely possible — this removes the load hazard while the operator still has full crane function. Then shut down the engine, sound the alarm, and evacuate.

Completing the pick prioritizes the work schedule over fire risk. Shutting down immediately leaves the load suspended while addressing the engine — the load hazard remains.

**67. A** — Total deductions: block (1,250) + slings (3 × 310 = 930) + shackles (5 × 42 = 210) = 2,390 lb. Net capacity = 61,000 − 2,390 = 58,610 lb. Payload of 57,800 lb is within net capacity by 810 lb. All components below the hook including all shackles must be deducted. The margin is narrow — payload weight should be certified before proceeding.

**68. C** — Any actual radius between two chart rows requires use of the greater radius row's lower capacity value. A 19-foot actual radius falls between the 16-foot and 22-foot rows. The 22-foot row value of 59,000 lb governs. Interpolation is not permitted. Proximity to the lower row is not a basis for using the lower-radius value.

**69. B** — The total hook load of 41,800 lb must be within net capacity at both the pick radius and the set radius. Net capacity at the set point of 30-foot radius is 33,500 lb. The total hook load of 41,800 lb exceeds this by 8,300 lb. The lift cannot proceed as planned regardless of the pick-point confirmation. The crane must be repositioned closer or the hook load reduced before this radius combination is attempted.

**70. C** — The chart already embedded a 1,200 lb block deduction in the published gross capacity values. The operator is using a 1,600 lb block — 400 lb heavier than assumed. The chart's gross capacity is therefore overstated by 400 lb for this heavier block. The effective gross capacity is 48,000 − 400 = 47,600 lb. Deduct rigging (880 lb): net = 46,720 lb. Payload of 44,500 lb is within net capacity.

**71. A** — The over-front directional chart governs for a confirmed pick directly over the front. Gross capacity in the over-front configuration is 42,000 lb. Required gross: block (1,100) + rigging (760) + payload (37,500) = 39,360 lb — within 42,000 lb. Net capacity = 42,000 − 1,860 = 40,140 lb. Payload of 37,500 lb is within net capacity. The 360-degree chart does not govern when the swing is confirmed within the front quadrant.

**72. D** — When both structural and stability limits are listed for the same configuration, the lower value is the rated capacity. The structural limit of 105,000 lb is lower than the stability limit of 128,000 lb and therefore governs. Total hook load of 98,000 lb is within the 105,000 lb structural limit. The lift can proceed. Averaging limits or using the stability limit would overload the structure.

**73. B** — After a crane reposition, the operator must verify the crane did not go out of level during travel and that all outrigger conditions remain confirmed before making any picks. A reposition changes the outrigger contact with the ground — the crane may have moved to a different soil condition, one pad may not have fully reseated, or the crane may have gone slightly out of level. These conditions must be confirmed before using any prior capacity check.

**74. C** — The 95-foot boom is physically installed — its chart section governs all picks. Gross capacity: 28,500 lb. Deductions: block (1,050) + rigging (820) = 1,870 lb. Net capacity = 26,630 lb. Required net of 26,000 lb is within net capacity by 630 lb. The 80-foot and 65-foot boom chart values are irrelevant — the installed boom length always governs regardless of which section shows more favorable values.

**75. A** — The critical lift threshold is 75% of the gross rated capacity. Gross capacity = 54,000 lb. Critical lift threshold = 54,000 × 0.75 = 40,500 lb. The current total hook load = 54,000 × 0.89 = 48,060 lb. Since

48,060 lb exceeds the 40,500 lb threshold, a critical lift plan and pre-lift meeting are required for this pick. The comparison is always total hook load versus 75% of gross rated capacity.

**76. C** — A configuration change from 25% to full outrigger extension must be performed with the load on the ground. After physical extension, the crane must be re-leveled within the manufacturer's tolerance — outrigger extension changes the crane's geometry and can alter levelness. All four tires must be confirmed off the ground before the full extension chart values apply. Only after all conditions are confirmed does the full extension chart become valid.

**77. B** — Crane A's share: 124,000 × 0.60 = 74,400 lb. Crane A's net capacity: 77,000 lb. 74,400 < 77,000 — within capacity by 2,600 lb. Crane B's share: 124,000 × 0.40 = 49,600 lb. Crane B's net capacity: 51,000 lb. 49,600 < 51,000 — within capacity by 1,400 lb. Both cranes are within their individual net capacities. The lift can proceed. Crane B's narrow margin warrants careful monitoring of load sharing accuracy during the lift.

**78. C** — The load chart note's "firm level ground" condition is met when the crane is leveled within the manufacturer's published tolerance. A crane leveled to within the 1% manufacturer tolerance on a 0.8% underlying slope has satisfied the leveling requirement. The note does not require zero-slope terrain — it requires a properly leveled crane on firm ground, which is confirmed in this case.

**79. A** — The actual operating radius reached 29 feet during the swing. Net capacity at 29 feet is 33,200 lb. Total hook load is 36,800 lb — exceeding net capacity by 3,600 lb. This is a rated capacity exceedance event regardless of the cause or duration. All crane movement must stop, the load must be landed at the nearest safe position, and a post-incident inspection must be completed before the crane returns to service.

**80. D** — The crane's maximum rated radius for the current configuration is 48 feet. Boom deflection under load pushed the actual radius to 50 feet — 2 feet beyond the chart maximum. Operating beyond the maximum rated radius means operating without a defined rated capacity. This constitutes a rated capacity exceedance event. A post-incident inspection is required before the crane returns to service regardless of whether structural damage is apparent.

**81. B** — The crane is on full outriggers — the full extension chart governs. Gross capacity: 52,000 lb. Deductions: block (1,100) + rigging (840) = 1,940 lb. Net capacity = 50,060 lb. Payload of 48,500 lb is within net capacity by 1,560 lb. At 96.9% of net capacity, certified payload weight and precise radius confirmation are essential before proceeding. The on-rubber and 50% extension values are irrelevant — actual configuration governs.

**82. A** — When the hook load varies across a series of picks, confirming capacity at the maximum radius is not sufficient. A heavier load at a shorter radius has its own capacity requirement that must be independently confirmed. The maximum-radius confirmation validates the heaviest load at the most restrictive configuration only if all picks use the same hook load. With varying hook loads, each load must be confirmed within net capacity at its specific pick radius.

**83. A** — Load chart capacity curves are not linear — they decrease at an increasing rate as radius grows. Linear interpolation between chart rows produces values that do not reflect the actual capacity at intermediate radii. More importantly, interpolation between chart rows is not a recognized methodology

under ASME B30.5 or standard industry practice. The 26-foot row value of 43,000 lb governs any pick between 18 and 26 feet without exception.

**84. D** — A critical lift plan is an engineering document approved for specific parameters. When a key parameter — the total hook load — changes by 4,200 lb, the plan's engineering basis changes. The revised hook load must be confirmed within net capacity at all planned radii, and all personnel must be re-briefed on the changed parameters before the pick proceeds. No individual — lift director, safety officer, or operator — has authority to approve an unplanned deviation from an approved critical lift plan.

**85. B** — The pick and set radii were both confirmed at 20 feet. The swing path passes through 24 feet where capacity is 15,000 lb lower than at 20 feet. The total hook load is 8,000 lb below the 20-foot gross capacity. Since the capacity reduction at 24 feet (15,000 lb) is greater than the available margin at 20 feet (8,000 lb), the total hook load exceeds net capacity at 24-foot swing radius. The maximum swing radius must be confirmed within net capacity before the lift proceeds.

**86. A** — Jib tip chart values are gross capacities from which all rigging must be deducted. Block (380) + rigging (290) = 670 lb total deductions. Net capacity = 6,800 − 670 = 6,130 lb. Payload of 6,000 lb is within net capacity by 130 lb. The margin is very narrow — certified payload weight and precise jib tip radius confirmation are essential. No minimum margin requirement of 500 lb or 20% exists in OSHA or ASME standards.

**87. A** — A 1-point LMI reading above the pre-lift calculation at working height most likely reflects minor boom deflection that has marginally increased the actual operating radius. This is a real condition — not instrument drift. The operator should note the reading and assess whether the deflection-induced radius increase is material enough to affect capacity before making additional picks at this configuration. At 93-94% of net capacity, any radius increase warrants attention.

**88. D** — The total hook load of 30,500 lb exceeds the on-rubber gross capacity of 18,500 lb by 12,000 lb. The crane is on rubber — the on-rubber chart governs. No time pressure, lift director authorization, or percentage threshold permits use of a chart section that does not match the crane's actual configuration. The load cannot be lifted on rubber. The outriggers must be extended or the pick deferred.

**89. B** — A 6% LMI increase on the 15th pick of an identical series — same load, same rigging, no crane reposition — indicates something in the crane's physical configuration has changed. The most likely cause is outrigger settling that has increased the operating radius or slightly changed the crane's level. Both the operating radius and outrigger conditions must be re-measured and re-confirmed before continuing the series.

**90. C** — The capacity confirmed at 28-foot radius does not apply to any other radius. Rated capacity is configuration-specific and changes with every radius change. A 6-foot radius increase from 28 to 34 feet can represent a significant capacity reduction depending on the crane's capacity curve at that boom length. The operator must look up gross capacity at 34 feet, apply all deductions, and confirm the total hook load is within net capacity before picking at the new radius.