Practice Test 14

Core Examination

Instructions: Select the best answer for each question. You have 90 minutes to complete this section.

1. What ground preparation is essential for crane operations?
   A. Visual inspection only
   B. Surface leveling only
   C. Adequate compaction and bearing capacity
   D. No preparation needed

2. When must competent persons inspect crane setups?
   A. Weekly
   B. Before operations and after changes
   C. Monthly
   D. Annually

3. What determines safe distance from excavations?
   A. Standard 5-foot rule
   B. Visual judgment only
   C. Distance irrelevant
   D. Soil type and excavation depth

4. When operating on slabs, what must be verified?
   A. Slab capacity for concentrated loads
   B. Slab age
   C. Slab color
   D. Surface temperature

5. What is required under outrigger pads?
   A. Partial contact acceptable
   B. Any surface works
   C. Solid bearing across entire pad
   D. Gravel only

6. During operations, when is crane level checked?
   A. Once daily
   B. Continuously or after changes
   C. Weekly

D. Monthly

7. What clearance applies to lines under 50 kV?
A. 10 feet or de-energization
B. 15 feet
C. 20 feet
D. 5 feet

8. When planning lifts, what must be calculated?
A. Crane age
B. Total weight including rigging
C. Time available
D. Weather forecast

9. What determines boom configuration selection?
A. Boom color
B. Fuel level
C. Time of day
D. Required reach, height, and capacity

10. When must public access be controlled?
A. When operations affect traffic areas
B. Never required
C. Only at night
D. Monthly

11. What is required near property boundaries?
A. Verbal notification
B. Higher insurance
C. Permission and clearance verification
D. Night operations

12. During critical lifts, what is essential?
A. Verbal agreement
B. Detailed planning and supervision
C. Standard procedures
D. No special requirements

13. When must travel routes be inspected?
A. Monthly

B. Annually
C. Inspection optional
D. Before travel for hazards

14. What indicates need for spotters?
A. Crane size
B. Limited operator visibility
C. Time of day
D. Fuel level

15. What must be established around hazard areas?
A. Break rooms
B. Offices
C. Barriers and exclusion zones
D. Parking areas

16. When operating near public roads, what is required?
A. Night operations
B. Special insurance
C. No requirements
D. Traffic control coordination

17. What is needed near airports?
A. FAA notification if required
B. Night operations
C. Special paint
D. Higher insurance

18. When must wind conditions be monitored?
A. Never required
B. Monthly
C. When approaching limits
D. Annually

19. When does weather require stopping operations?
A. Any precipitation
B. When safety is compromised
C. Never
D. Monthly

20. What is required for night operations?
A. Adequate illumination
B. Operations prohibited
C. Reduced capacity
D. Special permits

21. When are engineered dual-crane plans required?
A. Never
B. Complex critical tandem lifts
C. All dual lifts
D. Optional

22. What must be verified after configuration changes?
A. Insurance
B. Fuel level
C. Appropriate load charts
D. Crane color

23. What is prohibited during crane operations?
A. Personnel under loads
B. Radio use
C. Signal persons
D. Daytime operations

24. What establishes wind limits?
A. General guidelines
B. Operator preference
C. Project schedule
D. Manufacturer specifications

25. When must rescue plans be prepared?
A. Never required
B. Before high-risk operations
C. Monthly
D. Annually

26. What must be verified about counterweights?
A. Secure installation per specifications
B. Color
C. Age

D. Manufacturer name

27. What may be required near heliports?
A. Night operations
B. Special paint
C. Higher insurance
D. Height limits and coordination

28. What determines blocking requirements?
A. Block color
B. Block age
C. Load characteristics and rigging
D. Block manufacturer

29. When must safety briefings occur?
A. Monthly
B. Before each day's operations
C. Annually
D. Weekly

30. What is required for boom over buildings?
A. Verbal warning
B. Special permits
C. Higher insurance
D. Clearance or protective measures

31. What is the signal for "dog everything"?
A. Hands clasped in front of body
B. Arms overhead
C. Circular motion
D. One fist

32. When using radios, what is critical?
A. Clear language with confirmations
B. Fast speech
C. Abbreviated terms
D. Any style

33. What must signal persons do when visibility is lost?
A. Continue signaling

B. Estimate position
C. Stop or reposition
D. Signal faster

34. When must hand signals be reviewed?
A. Never
B. Monthly
C. Annually
D. Before new site or personnel

35. What is the signal for "retract boom"?
A. Arms overhead
B. Circular motion
C. Both fists pulling toward body
D. One arm extended

36. During limited visibility, what is required?
A. Illuminated or enhanced signals
B. No signaling possible
C. Voice only
D. Standard signals adequate

37. When can non-standard signals be used?
A. Never
B. Anytime
C. Only emergencies
D. After demonstration and agreement

38. What signal has absolute priority?
A. Radio commands
B. Stop from anyone
C. Hand signals
D. Horn signals

39. When must signal person qualifications be verified?
A. Weekly
B. Monthly
C. Before giving signals
D. Annually

40. What is required if signal person relocates?
A. Stop and establish visibility
B. Continue signaling
C. Move quickly
D. No action needed

41. When are relief personnel required?
A. Every hour
B. Never during operations
C. End of shift
D. When fatigue affects performance

42. What must operators confirm?
A. Weather
B. Fuel level
C. Understanding before executing
D. Time

43. When using voice commands, what is avoided?
A. Complete sentences
B. Ambiguous language
C. Specific terms
D. Slow speech

44. What ensures signal person visibility?
A. Position only
B. Voice volume
C. High-visibility clothing
D. Hand size

45. When must backup communication exist?
A. Never needed
B. When primary may fail
C. Only large cranes
D. Optional

46. Under OSHA, what must be assessed initially?
A. Fuel costs
B. Operator salary
C. Project budget

D. Ground conditions and hazards

47. What does OSHA require for operators?
A. Certification and evaluation
B. Experience only
C. Age only
D. No requirements

48. According to OSHA, when are inspections documented?
A. Never
B. Monthly only
C. Shift, annual, and after events
D. Optional

49. What must employers provide?
A. Transportation
B. Equipment familiarization
C. Lunch
D. Housing

50. Under OSHA, who supervises assembly?
A. Qualified A/D director
B. Any worker
C. Owner
D. Insurance agent

51. What does OSHA require for capacity information?
A. Verbal adequate
B. Memory sufficient
C. Accessible load charts
D. Optional

52. According to OSHA, when is fall protection required?
A. Never
B. Above 6 feet during A/D
C. Only above 10 feet
D. Optional

53. What must OSHA inspections document?
A. Deficiencies and corrections

B. Operator preferences
C. Fuel type
D. Crane color

54. Under OSHA, who approves modifications?
A. Operator
B. Manufacturer or engineer
C. Owner
D. Any supervisor

55. What does OSHA require for defects?
A. Document only
B. Continue cautiously
C. Ignore if minor
D. Correction or removal from service

56. According to OSHA, when must re-evaluation occur?
A. Every three years or when deficiencies arise
B. Never
C. Every 10 years
D. Monthly

57. What must OSHA inspections evaluate?
A. Paint only
B. Age only
C. Safety-critical systems
D. Fuel capacity

58. Under OSHA, what is required near power lines?
A. Verbal notification
B. Clearances or de-energization
C. Higher insurance
D. No requirements

59. What does OSHA require for load data?
A. Verbal adequate
B. Memory sufficient
C. Optional
D. Current accessible charts

60. According to OSHA, when can trainees operate?
A. Never
B. After 1 week
C. With certified operator present
D. Anytime

61. Under ASME B30.5, rated capacity means what?
A. Maximum manufacturer-rated load
B. Any load
C. Load plus 50 percent
D. Operator decision

62. What does ASME B30.5 require for rope?
A. Monthly
B. Annually
C. Optional
D. Shift inspection when in use

63. According to ASME B30.5, when must operations stop?
A. Monthly
B. When unsafe conditions exist
C. Quarterly
D. Annually

64. What does ASME B30.5 require for modifications?
A. Verbal approval
B. Owner approval
C. Manufacturer or engineer approval
D. No approval

65. Under ASME B30.5, what governs personnel platforms?
A. ASME B30.23 requirements
B. Standard procedures
C. Verbal agreement
D. Platforms prohibited

66. What does ASME B30.5 specify about rated loads?
A. Shall not be exceeded
B. Can exceed slightly
C. Operator discretion

D. Optional limits

67. According to ASME B30.5, when must indicators work?
A. Monthly
B. Before operations
C. Annually
D. Optional

68. What does ASME B30.5 require for maintenance?
A. Verbal reports
B. No records
C. Records prohibited
D. Written documentation

69. Under ASME B30.5, critical lifts are based on what?
A. Risk and consequences
B. Weight only
C. Time
D. Crane age

70. What does ASME B30.5 state about side loading?
A. Permitted
B. Increases capacity
C. No restrictions
D. Must be minimized

71. According to ASME B30.5, when are tests required?
A. After installation and major repairs
B. Weekly
C. Monthly
D. Optional

72. What does ASME B30.5 prohibit?
A. Tag lines
B. Radio use
C. Leaving loads unattended
D. Signal persons

73. Under ASME B30.5, uncertain operators must do what?
A. Stop and seek direction

B. Continue slowly
C. Document later
D. Consult anyone

74. What does ASME B30.5 require for rope removal?
A. Monthly
B. Annually
C. Never
D. When deterioration criteria met

75. According to ASME B30.5, who authorizes return to service?
A. Operator
B. Owner
C. Qualified person
D. Any mechanic

76. When reading load charts, what is identified first?
A. Operator
B. Current configuration
C. Fuel level
D. Weather

77. On load charts, radius is defined as what?
A. Horizontal distance from center
B. Vertical distance
C. Diagonal measure
D. Boom length

78. What happens as radius increases?
A. Both increase
B. No relationship
C. Capacity doubles
D. Capacity decreases

79. When using attachments, what is needed?
A. Main boom charts
B. No charts
C. Separate charts or deductions
D. Estimate

80. What must be deducted for net capacity?
A. Fuel
B. Hook block and rigging
C. Counterweight
D. Operator weight

81. On charts, special marks indicate what?
A. Highest capacity
B. Lowest capacity
C. Recommended capacity
D. Notes or conditions

82. When boom angle changes, what else changes?
A. Nothing
B. Color only
C. Radius and capacity
D. Speed only

83. Between chart values, what applies?
A. Higher capacity
B. Average
C. Lower capacity or conservative interpolation
D. Estimate freely

84. How are telescopic charts organized?
A. Alphabetically
B. By boom length with radii
C. Randomly
D. By age

85. What indicates capacity-limiting factors?
A. Bold text or notation
B. Color
C. Page number
D. Font size

86. When counterweight changes, what is needed?
A. Insurance
B. Color change
C. No action

D. Appropriate chart section

87. What must be considered for large loads?
A. Color
B. Age
C. Wind effects
D. Manufacturer

88. What do chart footnotes contain?
A. Crane history
B. Critical restrictions
C. Operator names
D. Maintenance logs

89. When configurations change, what is essential?
A. Insurance update
B. Color change
C. Correct chart reference
D. No action

90. What affects capacity for unbalanced loads?
A. Color
B. Center of gravity location
C. Age
D. Manufacturer

91. What converts engine power to hydraulic?
A. Manual crank
B. Engine-driven pump
C. Electric motor
D. Gravity

92. What indicates hydraulic problems?
A. Slow function or leaks
B. Normal operation
C. Proper temperature
D. Clean fluid

93. What do hydraulic filters do?
A. Increase pressure

B. Cool fluid
C. Add lubrication
D. Remove contaminants

94. What causes hydraulic overheating?
A. Excessive load or poor cooling
B. Proper operation
C. Clean filters
D. Low hours

95. What do relief valves control?
A. Flow direction
B. Temperature
C. Fluid level
D. Maximum pressure

Specialty Examination

Instructions: Select the best answer for each question. You have 60 minutes to complete this section.

1. What advantage do crawler cranes provide?
A. High road speed
B. Compact storage
C. Low maintenance
D. Superior stability and low ground pressure

2. On telescopic cranes, what synchronizes extension?
A. Hydraulic flow control and sensors
B. Manual coordination
C. Gravity
D. Operator skill alone

3. What gives lattice booms their strength advantage?
A. Solid construction
B. Heavy materials
C. Compact design
D. Triangulated structural framework

4. On all-terrain cranes, what enables off-road capability?
A. Single axle

B. Manual transmission
C. All-wheel drive and suspension
D. Fixed differential

5. How do lattice cranes achieve extreme heights?
A. Modular boom section assembly
B. Telescoping sections
C. Hydraulic extension
D. Fixed lengths

6. On telescopic cranes, what prevents boom retraction?
A. Friction only
B. Holding valves and locks
C. Gravity
D. Manual brakes

7. What advantage do fixed cabs provide?
A. Better visibility
B. Higher capacity
C. Improved comfort
D. Simpler design with lower maintenance

8. When assembling lattice booms, what is critical?
A. Speed
B. Visual inspection only
C. Proper pins and assembly sequence
D. Experience alone

9. What do boom pendants provide?
A. Boom extension
B. Angular support from mast
C. Rigging storage
D. Capacity increase

10. On all-terrain cranes, what manages multiple-axle steering?
A. Electronic control systems
B. Manual linkages
C. Separate operators
D. Mechanical cables

11. What capability do luffing jibs offer?
A. Higher capacity
B. Lower cost
C. Simpler operation
D. Radius adjustment without boom movement

12. When using offset jibs, what affects capacity?
A. Time of day
B. Offset angle
C. Wind alone
D. Operator skill

13. What limits maximum boom length?
A. Structural and stability constraints
B. Operator preference
C. Fuel capacity
D. Boom color

14. What provides rough-terrain maneuverability?
A. Long wheelbase
B. Compact size with crab steering
C. Multiple axles
D. Fixed suspension

15. What controls lattice boom angle?
A. Manual cranks
B. Counterweight position
C. Boom hoist system
D. Hydraulic cylinders only

16. How do fly jib capacities compare to main boom?
A. Significantly reduced
B. No change
C. Increased
D. Slight increase

17. What establishes safe jib length limits?
A. Jib color
B. Operator decision
C. Ground conditions

D. Manufacturer specifications

18. What does wider track spacing provide?
A. Faster travel
B. Lower fuel use
C. Greater stability and capacity
D. Reduced maintenance

19. What is the primary telescopic crane advantage?
A. Higher capacity
B. Quick setup without assembly
C. Longer boom
D. Lower cost

20. When using boom extensions, what is critical?
A. Proper installation and charts
B. Extension color
C. Extension age
D. Extension weight

21. Which hoist typically offers faster speeds?
A. Main hoist
B. Manual hoist
C. All equal
D. Auxiliary hoist

22. What provides hydraulic crane swing?
A. Manual rotation
B. Hydraulic motor with brake
C. Wire rope
D. Electric motor only

23. When changing track width, what is essential?
A. Track color
B. Insurance notification
C. Appropriate capacity chart
D. Width irrelevant

24. When using boom inserts, what is critical?
A. Insert color

B. Insert age
C. Manufacturer location
D. Correct installation and charts

25. What guides boom section telescoping?
A. Internal wear pads and guides
B. External rails
C. Operator vision
D. Gravity

26. On lattice booms, which members carry primary loads?
A. Lacing members
B. Main chord members
C. Battens
D. Bolts

Practical Examination

Instructions: Select the best answer for each question. This section evaluates your understanding of hands-on operating procedures and inspection requirements.

1. When inspecting wire rope, what requires immediate removal?
A. Proper flexibility
B. Adequate lubrication
C. Manufacturer markings visible
D. Damage exceeding removal criteria

2. What is the proper rope inspection frequency?
A. Weekly
B. Monthly
C. Each shift when in regular use
D. Annually

3. During pre-operational checks, what is acceptable?
A. Milky appearance
B. Clean fluid at proper level
C. Empty reservoir
D. Overfilled condition

4. When inspecting hooks, what requires replacement?

A. 15 percent or manufacturer limit exceeded
B. 5 percent throat increase
C. 10 percent increase
D. 12 percent increase

5. What indicates proper LMI function?
A. Display illuminated
B. Power on
C. Alarm sounds
D. Accurate configuration and load tracking

6. During brake testing, what is proper function?
A. Gradual stopping
B. Continued movement
C. Immediate stop and hold
D. Delayed engagement

7. What verifies hoist brake function?
A. Visual inspection
B. Load hold without drift
C. Noise check
D. Fluid level check

8. What is verified before engine start?
A. Horn tested
B. Boom extended
C. Controls in neutral
D. Radio on

9. During warm-up, what is monitored?
A. Ambient temperature
B. Oil pressure and temperature
C. Fuel level only
D. Radio signal

10. When deploying outriggers, what is verified?
A. Crane level maintained
B. Deployment speed
C. Paint condition
D. Serial numbers

11. What is proper hoist testing procedure?
A. Maximum speed only
B. Minimum speed only
C. Visual inspection adequate
D. Variable speeds with brake test

12. During control testing, what is acceptable?
A. Delayed response
B. Binding movement
C. Smooth proportional response
D. Erratic function

13. When checking boom indicators, what is verified?
A. Accurate length display
B. Indicator color
C. Indicator location
D. Indicator age

14. What rope condition requires immediate removal?
A. Proper flexibility
B. Adequate lubrication
C. Correct diameter
D. Kinking or bird-caging

15. During hydraulic inspection, what indicates contamination?
A. Milky or cloudy fluid
B. Clear appearance
C. Proper level
D. Amber color

16. When testing anti-two-block, what indicates proper function?
A. Device visible
B. Device labeled
C. Warnings and cutout activation
D. Device makes sound

17. What is proper lock verification?
A. Visual only
B. Engagement verification with load test

C. Paint check
D. Listen for sounds

18. During structural inspection, what requires attention?
A. Normal paint wear
B. Cracks or deformation
C. Minor rust
D. Proper labels

19. When inspecting terminations, what is critical?
A. Secure attachment without loosening
B. Termination color
C. Termination age
D. Termination weight

20. What must LMI displays provide?
A. Display color
B. Display size
C. Functional readable information
D. Display age

21. During rope inspection, what seating is required?
A. Proper seating in all grooves
B. Can ride flanges
C. Seating not critical
D. Visual adequate

22. When checking hoses, what requires replacement?
A. Hoses flexible
B. Hoses have fittings
C. Hoses labeled
D. Cracking, bulging, or deterioration

23. What is proper shutdown procedure?
A. Leave running
B. Lower boom, secure controls, document
C. Secure controls only
D. Lower boom only

24. During swing testing, what indicates proper operation?

A. Continuous rotation
B. Jerky movement
C. Smooth operation with immediate brake
D. Delayed response

25. When inspecting extinguishers, what requires service?
A. Extinguisher mounted
B. Low pressure or expired inspection
C. Extinguisher visible
D. Extinguisher labeled

26. What must be verified about pins?
A. Full insertion with retention devices
B. Pin color
C. Pin age
D. Pin manufacturer

27. During final verification, what is confirmed?
A. Crane painted
B. Crane expensive
C. Crane large
D. All systems functional and area clear

28. When inspecting pins, what indicates problems?
A. Proper paint
B. Wear, cracks, or elongated holes
C. Correct labels
D. Original installation

29. What indicates proper cylinder operation?
A. Cylinders visible
B. Cylinders painted
C. Smooth operation without leaks
D. Cylinders labeled

30. During high winds, what is proper crane positioning?
A. Per manufacturer specifications
B. Maximum height
C. Horizontal
D. Fully extended

Answers & Explanations - Practice Test 14

Core Examination

1. **Correct Answer: C (Adequate compaction and bearing capacity)**

Ground preparation requires adequate compaction and bearing capacity for crane operations. Proper compaction ensures soil can support crane loads without settlement creating instability. Bearing capacity must meet or exceed calculated loads from outriggers or tracks. Engineering analysis determines required bearing capacity while proper compaction techniques achieve specified values. Inadequate preparation causes ground failure, crane instability, or tipping creating catastrophic accidents.

2. **Correct Answer: B (Before operations and after changes)**

Competent persons must inspect crane setups before operations and after changes. Initial inspections verify proper setup, adequate ground support, and correct configuration before work begins. Re-inspection after changes such as weather events affecting ground, detected settlement, or configuration modifications ensures continued safety. These inspections identify issues requiring correction before they create hazardous conditions during operations.

3. **Correct Answer: D (Soil type and excavation depth)**

Safe distance from excavations is determined by soil type and excavation depth. Excavations create failure zones extending beyond visible edges with extent dependent on soil strength and excavation geometry. Weaker soils require greater setback distances. Deeper excavations create larger failure zones extending farther laterally. Engineering analysis considering these factors determines safe distance preventing ground failure under crane loading.

4. **Correct Answer: A (Slab capacity for concentrated loads)**

When operating on slabs, slab capacity for concentrated loads must be verified. Concrete slabs designed for distributed floor loads may fail under concentrated crane outrigger loads creating punch-through failures. Engineering evaluation confirms slab thickness, reinforcement, and underlying support can handle anticipated concentrated loads or identifies need for load-spreading measures such as additional cribbing preventing slab failure.

5. **Correct Answer: C (Solid bearing across entire pad)**

Under outrigger pads, solid bearing across entire pad is required. The entire pad must rest on prepared solid surface with no voids, uneven areas, or soft spots underneath. Partial support creates concentrated loading causing excessive bearing pressure at contact points and potential failure. Full contact ensures uniform load distribution across complete pad area maximizing effective bearing capacity and stability.

6. **Correct Answer: B (Continuously or after changes)**

During operations, crane level is checked continuously or after changes. Real-time monitoring identifies developing problems from settlement or changes allowing immediate correction. Crane level directly affects stability margins requiring immediate attention if specifications are exceeded. Continuous monitoring combined with checks after configuration changes maintains safe operations throughout the workday preventing tipping from out-of-level conditions.

7. **Correct Answer: A (10 feet or de-energization)**

For lines under 50 kV, OSHA requires 10 feet clearance or de-energization by utility company. This clearance prevents electrical contact or arcing protecting personnel and equipment from electrocution. Lines must be de-energized if adequate clearance cannot be maintained throughout all boom movements and operating conditions. This is one of the most critical crane safety requirements preventing electrocution fatalities.

8. **Correct Answer: B (Total weight including rigging)**

When planning lifts, total weight including rigging must be calculated. Total suspended weight includes actual load plus all rigging components such as slings, shackles, spreader bars, and lifting beams. This complete weight determines required crane capacity for safe operations. Failing to account for rigging weight results in overloading creating serious safety hazards and potential equipment failure.

9. **Correct Answer: D (Required reach, height, and capacity)**

Boom configuration selection is determined by required reach, height, and capacity needs. These three interrelated factors establish what boom length and angle are required for successful lift completion. Configuration must provide adequate capacity at required radius while achieving necessary vertical height for placement. All three parameters must be satisfied simultaneously for successful lift planning and safe execution.

10. **Correct Answer: A (When operations affect traffic areas)**

Public access must be controlled when operations affect traffic areas through boom swing across lanes, load placement blocking traffic, or crane positioning obstructing flow. Control prevents vehicles from entering hazardous areas and maintains safe orderly movement around work zones. Coordination with traffic authorities ensures proper implementation of control measures protecting public safety.

11. **Correct Answer: C (Permission and clearance verification)**

Near property boundaries, permission and clearance verification are required. Verification ensures operations remain within authorized boundaries throughout all movements. Permissions from adjacent property owners are needed if boom or loads will affect their property creating trespass or liability issues.

Written agreements establish authorization and protective measures preventing legal issues and ensuring neighbor safety.

12. **Correct Answer: B (Detailed planning and supervision)**

During critical lifts, detailed planning and supervision are essential. Critical lifts present higher risks requiring enhanced procedures beyond standard operations. Detailed planning documents all procedures, identifies hazards, and establishes controls while qualified supervision provides expert oversight throughout execution. Comprehensive planning and experienced supervision reduce risks when performing complex or hazardous lifts with reduced safety margins.

13. **Correct Answer: D (Before travel for hazards)**

Travel routes must be inspected before travel for hazards including overhead and lateral obstructions, surface strength, and clearance restrictions. Inspection identifies hazards requiring removal, route modification, or special precautions during movement. This verification prevents contact with overhead obstructions and ensures adequate clearances throughout travel path protecting equipment and preventing accidents during crane relocation.

14. **Correct Answer: B (Limited operator visibility)**

Limited operator visibility indicates need for spotters. When blind spots prevent operators from seeing travel paths, loads, or surrounding areas clearly, spotters are needed to provide guidance. Spotters positioned where they can see provide direction through areas operators cannot directly observe maintaining safe movements and preventing collisions with obstructions or personnel.

15. **Correct Answer: C (Barriers and exclusion zones)**

Around hazard areas, barriers and exclusion zones must be established. Physical barriers prevent unauthorized personnel from entering swing radius, fall zones, or areas where they could be struck by loads or equipment. These zones encompass all hazardous regions with barriers providing positive protection against inadvertent access to dangerous areas throughout operations.

16. **Correct Answer: D (Traffic control coordination)**

When operating near public roads, traffic control coordination is required. Plans define routing, closures, and control methods appropriate for traffic volumes and conditions. Trained flaggers or traffic control devices direct vehicles safely around operations preventing conflicts. Professional traffic control prevents vehicles from entering hazardous zones maintaining public safety throughout work duration.

17. **Correct Answer: A (FAA notification if required)**

Near airports, FAA notification if required is needed. Cranes can interfere with aircraft navigation, approach paths, or radar systems requiring Federal Aviation Administration notification based on height and proximity. Cranes exceeding certain heights in approach zones may require special lighting, marking, or operational restrictions coordinated with aviation authorities ensuring air safety.

18. **Correct Answer: C (When approaching limits)**

Wind conditions must be monitored when approaching limits allowing operators to track actual speeds. Continuous monitoring provides real-time data for informed decisions about continuing or stopping operations before limits are exceeded. This prevents operating in winds compromising stability or control maintaining safety margins throughout changing weather conditions.

19. **Correct Answer: B (When safety is compromised)**

Weather requires stopping operations when safety is compromised through visibility reduction preventing clear view of operations, or equipment function is affected through ice accumulation, electrical problems, or reduced friction. Safety must not be compromised by adverse weather regardless of project schedules or pressures to continue working creating hazardous conditions.

20. **Correct Answer: A (Adequate illumination)**

For night operations, adequate illumination is required including crane, loads, landing areas, rigging operations, and personnel positions. Lighting must allow clear visibility of operations, load positions, hazards, and hand signals throughout work areas. Adequate illumination prevents accidents from reduced visibility maintaining equivalent safety standards to daylight operations allowing safe work continuation.

21. **Correct Answer: B (Complex critical tandem lifts)**

Engineered dual-crane plans are required for complex critical tandem lifts where load distribution, rigging configuration, or operational complexity require engineering analysis and documentation. Engineering ensures load sharing is calculated correctly, rigging is adequate for divided loading, and procedures account for coordination requirements and potential failure modes preventing accidents during dual operations.

22. **Correct Answer: C (Appropriate load charts)**

After configuration changes, appropriate load charts must be verified. Configuration changes such as boom length adjustments or counterweight modifications require different chart sections providing accurate capacity data. Charts must match actual configuration to provide correct capacity information. Using charts for previous configurations creates serious overload risks from incorrect capacity data for actual equipment setup.

23. **Correct Answer: A (Personnel under loads)**

During crane operations, personnel under loads is prohibited by OSHA and ASME standards. This fundamental safety requirement prevents injuries from dropped loads or rigging failures which are leading causes of crane fatalities. All personnel must remain clear of areas under suspended loads or boom paths. Operations stop until personnel move to safe locations outside load zones.

24. **Correct Answer: D (Manufacturer specifications)**

Manufacturer specifications establish wind limits based on crane design, stability characteristics, structural capacity, and testing results. Manufacturers determine maximum wind speeds through engineering analysis and field testing ensuring adequate stability and control margins under wind loading for safe operations. Manufacturer limits must be followed as they represent engineered safe operating parameters.

25. **Correct Answer: B (Before high-risk operations)**

Rescue plans must be prepared before high-risk operations such as proximity to electrical hazards, remote locations, or situations where standard emergency response may be delayed or inadequate. Plans ensure personnel understand response protocols and necessary equipment is available on site. Preparation allows effective response if emergencies develop during high-risk activities.

26. **Correct Answer: A (Secure installation per specifications)**

About counterweights, secure installation per specifications must be verified. Counterweight must be properly positioned and fastened per manufacturer instructions preventing movement or detachment during operations. Loose counterweight can shift creating sudden stability loss leading to tipping or fall causing catastrophic accidents. All fasteners must be properly installed and torqued to specification.

27. **Correct Answer: D (Height limits and coordination)**

Near heliports, height limits and coordination may be required. Cranes can interfere with helicopter approach and departure paths creating aviation hazards. Notification allows heliport operators to adjust operations, establish restrictions, or coordinate timing of activities. Height limits may apply in certain zones. Coordination ensures both crane and helicopter operations proceed safely.

28. **Correct Answer: C (Load characteristics and rigging)**

Blocking requirements are determined by load characteristics and rigging including shape, weight distribution, center of gravity location, and rigging configuration. Loads with irregular shapes or uneven distribution may require blocking to prevent tipping or rotation during placement. Rigging geometry may necessitate blocking for proper load positioning and stability during lifting and placement operations.

29. **Correct Answer: B (Before each day's operations)**

Safety briefings must occur before each day's operations. Daily briefings ensure personnel understand hazards, procedures, assignments, and communication methods for that day's specific work activities. Conditions, personnel, and tasks may change daily requiring fresh communication of safety information ensuring everyone starts with current operational information and hazard awareness.

30. **Correct Answer: D (Clearance or protective measures)**

For boom over buildings, clearance or protective measures are required. Clearance verification ensures adequate distance throughout movement paths preventing contact with structures. Protective measures such as padding, temporary removal of fragile items, or evacuation of personnel may be needed if adequate clearance cannot be maintained. Either clearance or protection prevents damage or injury.

31. **Correct Answer: A (Hands clasped in front of body)**

The standard hand signal for "dog everything" consists of hands clasped in front of body. This signal indicates all functions should stop immediately and loads should be secured in current positions. The clasping motion provides clear visual indication that all movements must cease and the crane should be made safe. This is an emergency signal requiring immediate response.

32. **Correct Answer: A (Clear language with confirmations)**

When using radios, clear language with confirmations is critical. Communications must use unambiguous terminology without shortcuts or jargon and operators must confirm understanding through acknowledgment or repeat-back before executing commands. This protocol ensures communications are understood correctly completing the communication loop before potentially hazardous movements begin preventing misunderstandings.

33. **Correct Answer: C (Stop or reposition)**

When visibility is lost, signal persons must stop or reposition to locations where clear visibility can be re-established. Someone with clear view must monitor loads and operations throughout lift cycles for safe control. Continuing without visibility creates serious hazards from inability to detect problems, load swing, or obstructions requiring immediate cessation until visibility is restored.

34. **Correct Answer: D (Before new site or personnel)**

Hand signals must be reviewed before new site or personnel to ensure mutual understanding of all signals that will be used during operations. This review prevents misunderstandings from unfamiliarity with standard signals, regional variations, or site-specific signals. All parties must demonstrate understanding before operations begin ensuring everyone uses and interprets signals correctly.

35. **Correct Answer: C (Both fists pulling toward body)**

The standard hand signal for "retract boom" consists of both fists pulling toward body in a motion simulating pulling boom sections inward. This signal provides intuitive visual representation of the desired retraction movement distinguishing it clearly from extension signals and indicating direction of desired movement to operators.

36. **Correct Answer: A (Illuminated or enhanced signals)**

During limited visibility, illuminated or enhanced signals are required. Lighted wands, flashlights, chemical light sticks, or reflective clothing make hand signals visible despite darkness, fog, dust, or other visibility-reducing conditions. Enhanced visibility maintains effective communication when normal signals would be difficult or impossible to see clearly ensuring safe operations can continue.

37. **Correct Answer: D (After demonstration and agreement)**

Non-standard signals can be used after demonstration and agreement by all parties involved in operations. Special signals must be demonstrated to operators, signal persons, and supervisors ensuring everyone understands their meanings without ambiguity. All personnel must agree on signal meanings before using non-standard signals during operations preventing misunderstandings that could cause dangerous actions.

38. **Correct Answer: B (Stop from anyone)**

Stop from anyone has absolute priority over all other signals regardless of source. When stop is given by any person for any reason, operators must stop immediately without attempting to determine which other signal to follow or questioning the stop command. This absolute priority ensures immediate response to safety concerns. Anyone observing danger can stop operations.

39. **Correct Answer: C (Before giving signals)**

Signal person qualifications must be verified before giving signals to crane operators. This verification ensures individuals directing crane movements are qualified through training and evaluation demonstrating knowledge and ability to give proper signals. Operating with unqualified signal persons creates serious accident risks from incorrect signals, poor judgment, or inadequate understanding of crane operations.

40. **Correct Answer: A (Stop and establish visibility)**

If signal person relocates, stop and establish visibility is required before continuing operations. Operations must stop and new visibility must be confirmed from the new position. Operators must know where to look for signals and signal persons must verify adequate visibility from new positions. Clear communication must be re-established before continuing preventing confusion.

41. **Correct Answer: D (When fatigue affects performance)**

Relief personnel are required when fatigue affects performance reducing attention span, reaction time, or communication clarity. Effective signaling requires full mental acuity and physical capability throughout shifts. Fatigued personnel create safety risks through reduced performance, slower reactions, impaired judgment, and increased likelihood of errors during critical signaling activities requiring replacement.

42. **Correct Answer: C (Understanding before executing)**

Operators must confirm understanding before executing signals received via any communication method. This verification through acknowledgment or repeat-back ensures signals were received and understood correctly without misinterpretation. The communication loop must be complete confirming mutual understanding before potentially hazardous movements begin. Confirmation prevents misunderstandings that could cause accidents.

43. **Correct Answer: B (Ambiguous language)**

When using voice commands, ambiguous language is avoided. All communications should use specific unambiguous terminology that cannot be misinterpreted or confused. Standard terms for directions, functions, and actions ensure instructions are understood correctly. Ambiguous language creates confusion and dangerous misunderstandings during operations requiring immediate correction when detected.

44. **Correct Answer: C (High-visibility clothing)**

High-visibility clothing ensures signal person visibility to crane operators. High-visibility apparel in orange or lime colors with reflective striping makes signal persons readily identifiable allowing operators to locate them quickly against complex backgrounds. This visibility is essential in varying lighting conditions and complex work environments ensuring operators can always see signal persons clearly.

45. **Correct Answer: B (When primary may fail)**

Backup communication must exist when primary may fail from equipment malfunction, radio interference, environmental conditions, or battery depletion during extended operations. Predetermined backup methods ensure communication can continue if primary systems fail maintaining safe control under all circumstances. This redundancy prevents loss of communication during critical operations.

46. **Correct Answer: D (Ground conditions and hazards)**

Under OSHA, ground conditions and hazards must be assessed initially before equipment setup or operations begin. This comprehensive hazard assessment identifies conditions requiring special precautions including ground bearing capacity, power line proximity, fall hazards, and proximity hazards. The assessment establishes foundation for comprehensive safe operation planning identifying all significant hazards.

47. **Correct Answer: A (Certification and evaluation)**

OSHA requires for operators certification and evaluation. Certification by accredited testing organizations ensures operators have been tested to national standards demonstrating baseline competency. Employer evaluation verifies operators can safely operate specific equipment types in actual site conditions with site-specific hazards. Both components ensure operator competency and readiness.

48. **Correct Answer: C (Shift, annual, and after events)**

According to OSHA, inspections are documented during shift inspections before daily use, annual comprehensive inspections by qualified inspectors, and after events such as repairs, incidents, or modifications affecting safety. Documentation provides accountability, historical records, and verification of compliance with inspection requirements demonstrating proper equipment maintenance and due diligence.

49. **Correct Answer: B (Equipment familiarization)**

Employers must provide equipment familiarization per OSHA requirements. This training supplements certification ensuring operators understand specific controls, capacities, characteristics of actual equipment they will operate, and site-specific hazards and procedures. Familiarization bridges general certification knowledge to actual working conditions and specific equipment ensuring safe effective operations.

50. **Correct Answer: A (Qualified A/D director)**

Under OSHA, qualified assembly/disassembly director must supervise assembly operations. This individual has specific knowledge of assembly procedures ensuring manufacturer instructions are followed correctly, verifying connection integrity, and coordinating assembly activities. The A/D director ensures safe assembly practices preventing accidents during high-risk assembly and disassembly work.

51. **Correct Answer: C (Accessible load charts)**

OSHA requires for capacity information accessible load charts. Charts must be readily available to operators in the cab or at controls during operations for reference allowing capacity determination for planned lifts throughout workdays. Charts must match equipment configuration providing accurate capacity information. Operators need this information for continuous lift planning and execution.

52. **Correct Answer: B (Above 6 feet during A/D)**

According to OSHA, fall protection is required above 6 feet during assembly/disassembly operations. Personal fall arrest systems, guardrail systems, or safety nets protect workers from fall hazards during boom assembly and other elevated A/D work. This requirement recognizes serious injury potential from falls during assembly activities which are among most hazardous crane operations.

53. **Correct Answer: A (Deficiencies and corrections)**

OSHA inspections must document deficiencies and corrections identifying all defects, wear, or unsafe conditions affecting safe operations and recording how issues were addressed. This documentation provides accountability, historical records, and verification that equipment is maintained safely with proper follow-through on identified problems ensuring compliance and safety.

54. **Correct Answer: B (Manufacturer or engineer)**

Under OSHA, manufacturer or engineer must approve modifications to cranes or load-handling equipment. Only these qualified parties have technical expertise to verify through structural and stability analysis that modifications maintain adequate safety factors and do not adversely affect structural integrity, stability, or other critical safety characteristics. Unauthorized modifications void certifications.

55. **Correct Answer: D (Correction or removal from service)**

OSHA requires for defects correction or removal from service. Defects must be corrected before continued use or equipment must be removed from service until repairs are completed and verified. Operating with known defects violates OSHA safety requirements and creates serious hazards to operators and workers. Equipment cannot return until verified safe by qualified personnel.

56. **Correct Answer: A (Every three years or when deficiencies arise)**

According to OSHA, re-evaluation must occur every three years or when deficiencies arise requiring immediate assessment. Periodic re-evaluation ensures operators maintain competency over time. Deficiency-triggered evaluation addresses performance problems immediately requiring assessment and potential additional training or remediation ensuring ongoing operator competency throughout careers.

57. **Correct Answer: C (Safety-critical systems)**

OSHA inspections must evaluate safety-critical systems including structural elements, mechanical systems, safety devices, controls, wire rope, and all components essential for safe operations. Comprehensive inspections identify defects, wear, or conditions affecting safe operations. All systems essential for safe operation must be thoroughly evaluated during required inspections ensuring equipment integrity.

58. **Correct Answer: B (Clearances or de-energization)**

Under OSHA near power lines, clearances or de-energization must be established and maintained. Voltage-based clearance requirements or de-energization procedures verified by utility prevent electrocution from electrical contact or arcing. These measures protect personnel and equipment from electrocution hazards which are among most serious and fatal crane-related risks requiring strict compliance.

59. **Correct Answer: D (Current accessible charts)**

OSHA requires for load data current accessible charts matching equipment configuration. Charts must be available for operator reference during operations. Accurate current capacity information is essential for lift planning and safe execution throughout workdays. Outdated charts, charts for wrong configurations, or inaccessible charts prevent proper capacity verification creating overload risks.

60. **Correct Answer: C (With certified operator present)**

According to OSHA, trainees can operate with certified operator present who is physically at controls location. This allows hands-on training under direct expert supervision during actual operations. The certified operator must be able to take immediate control if necessary. Physical presence at controls ensures immediate intervention capability during training preventing accidents.

61. **Correct Answer: A (Maximum manufacturer-rated load)**

Under ASME B30.5, rated capacity means maximum manufacturer-rated load for specific configurations and conditions. Rated capacities are established by manufacturers through design analysis and testing accounting for all operating conditions and including appropriate safety factors. These ratings ensure safe operations within designed structural and stability limits.

62. **Correct Answer: D (Shift inspection when in use)**

ASME B30.5 requires for rope shift inspection when in regular use. This frequent daily inspection allows operators to identify rope deterioration including broken wires, wear, kinking, or corrosion before defects progress to dangerous levels threatening failure. Daily inspection is fundamental to rope management ensuring early problem detection when they can be addressed safely.

63. **Correct Answer: B (When unsafe conditions exist)**

According to ASME B30.5, operations must stop when unsafe conditions exist including equipment malfunction, damage, defects affecting safe operation, or hazardous environmental conditions. Equipment cannot return to service until conditions are corrected and verified safe by qualified personnel. This requirement prevents continued operation with known hazards.

64. **Correct Answer: C (Manufacturer or engineer approval)**

ASME B30.5 requires for modifications manufacturer or engineer approval through written documentation. Only these qualified parties can verify through engineering analysis that modifications maintain adequate safety factors and do not adversely affect structural integrity, stability, or other critical characteristics. Proper approval ensures modifications are safe and properly documented.

65. **Correct Answer: A (ASME B30.23 requirements)**

Under ASME B30.5, ASME B30.23 requirements govern personnel platforms and personnel hoisting operations. These special requirements include platform design standards, capacity reductions, safety devices including backup systems, and operational procedures ensuring personnel safety during high-risk personnel hoisting operations addressing unique hazards of carrying people.

66. **Correct Answer: A (Shall not be exceeded)**

ASME B30.5 specifies about rated loads they shall not be exceeded under any circumstances. This fundamental requirement prevents overloading that could cause equipment failure, instability, structural damage, or tipping. Operating within rated capacity maintains designed safety margins essential for safe operations. Exceeding rated loads is prohibited.

67. **Correct Answer: B (Before operations)**

According to ASME B30.5, indicators must work before operations begin each shift. Operators rely on boom angle, length, radius, and other indicator information for accurate chart reading and capacity verification throughout operations. Non-functional indicators prevent proper capacity determination creating serious overload risks requiring repair before operations can safely commence.

68. **Correct Answer: D (Written documentation)**

ASME B30.5 requires for maintenance written documentation. These records document inspections performed, maintenance activities completed, and repairs made providing comprehensive equipment history and verification of required maintenance compliance. Written records provide accountability, trending information, and demonstrate proper equipment care and regulatory compliance.

69. **Correct Answer: A (Risk and consequences)**

Under ASME B30.5, critical lifts are based on risk and consequences of failure. This includes operational complexity, proximity to hazards, valuable or sensitive loads, or situations where failure would cause significant injury, death, or major property damage. Risk assessment determines when lifts require special planning, procedures, and supervision beyond standard operations.

70. **Correct Answer: D (Must be minimized)**

ASME B30.5 states about side loading it must be minimized at all times during operations. Side loading creates dangerous bending stresses in booms not designed for such loads. Even minor side loads can cause structural failure or accelerated fatigue damage. Operators must maintain vertical load line alignment throughout operations preventing side loading.

71. **Correct Answer: A (After installation and major repairs)**

According to ASME B30.5, load tests are required after initial installation and major repairs affecting load-handling components. These tests verify structural and mechanical components can support rated loads with appropriate safety margins after changes affecting capacity or structural integrity. Load testing confirms equipment safety before returning to service.

72. **Correct Answer: C (Leaving loads unattended)**

ASME B30.5 prohibits leaving loads unattended while suspended. Leaving loads suspended when cranes are unattended creates hazards from potential rigging failure, equipment malfunction, or unauthorized access by personnel. Loads must be landed safely and secured before operators leave cranes unattended. This prevents accidents during unattended periods.

73. **Correct Answer: A (Stop and seek direction)**

Under ASME B30.5, uncertain operators must stop operations and seek direction from supervisors or qualified persons. Proceeding with uncertainty about proper procedures or operations safety creates serious accident risks. Operations resume only after safety is confirmed and proper procedures are clarified through consultation with knowledgeable experienced personnel.

74. **Correct Answer: D (When deterioration criteria met)**

ASME B30.5 requires for rope removal when deterioration criteria met. Specific criteria including numbers of broken wires in various patterns, diameter reduction percentages, kinking, bird-caging, corrosion, and other defined defects identify when rope strength has deteriorated to unsafe levels. Meeting any criterion mandates immediate replacement.

75. **Correct Answer: C (Qualified person)**

According to ASME B30.5, qualified person authorizes return to service after repairs or corrections. This individual verifies repairs were performed correctly according to manufacturer specifications, equipment is safe for operations, and all safety systems function properly before authorizing work resumption. Qualified verification ensures equipment is actually safe before returning to operations.

76. **Correct Answer: B (Current configuration)**

When reading load charts, current configuration is identified first including boom length, counterweight amount, outrigger extension positions, and attachments installed. Configuration determines which specific chart section applies and what capacity is available for operations. Accurate configuration identification is essential foundation for proper chart use and capacity determination.

77. **Correct Answer: A (Horizontal distance from center)**

On load charts, radius is defined as horizontal distance from center of rotation to vertical centerline of hoist line under load. This horizontal measurement determines capacity for operating conditions since it directly affects overturning moment. Radius changes with boom angle variations even if boom length remains constant.

78. **Correct Answer: D (Capacity decreases)**

As radius increases, capacity decreases due to physics of leverage and stability. Greater radius increases overturning moment that loads create, reducing load that stability or structural capacity can support safely. This fundamental inverse relationship means capacity at maximum radius is small fraction of capacity at minimum radius governing many lift operations.

79. **Correct Answer: C (Separate charts or deductions)**

When using attachments, separate charts or deductions are needed. Jibs, extensions, and other attachments significantly alter capacity compared to main boom alone due to additional weight and changed loading geometry. Special chart sections or specified deduction factors provide accurate capacity for configurations with attachments preventing dangerous overload.

80. **Correct Answer: B (Hook block and rigging)**

Hook block and rigging must be deducted for net capacity available for actual loads. Hook block and any rigging above the load are supported by crane consuming available capacity. Only remaining net capacity after these deductions is available for actual loads being lifted. This calculation is essential for preventing overload situations.

81. **Correct Answer: D (Notes or conditions)**

On charts, special marks indicate notes or conditions requiring operator attention and compliance. These markings identify special requirements, capacity limitations, operational restrictions, configuration requirements, or transition points between limiting factors. All special markings must be understood and followed as they convey critical operational information affecting safe capacity.

82. **Correct Answer: C (Radius and capacity)**

When boom angle changes, radius and capacity change together. Raising boom angle decreases radius bringing load closer to centerline and generally increases capacity. Lowering boom angle increases radius moving load outward and decreases capacity. These parameters are directly interdependent requiring coordinate consideration during operations and lift planning.

83. **Correct Answer: C (Lower capacity or conservative interpolation)**

Between chart values, lower capacity or conservative interpolation applies for safety. Using lower listed capacity ensures adequate safety margins accounting for measurement uncertainties and dynamic forces during operations. Conservative approaches maintain safety when operating between specific chart values where exact capacity is not explicitly listed.

84. **Correct Answer: B (By boom length with radii)**

Telescopic charts are organized by boom length sections showing capacities at various operating radii for each specific length. This organization allows operators to find their current boom length section, then read capacity for their specific operating radius within that section ensuring proper capacity determination for configuration.

85. **Correct Answer: A (Bold text or notation)**

Capacity-limiting factors are indicated by bold text or special notation showing whether structural capacity or stability limits capacity at specific operating points. Understanding which factor limits capacity helps operators recognize when configuration changes might increase available capacity or when limits are absolute for that configuration.

86. **Correct Answer: D (Appropriate chart section)**

When counterweight changes, appropriate chart section is needed matching actual counterweight installed. Different counterweight amounts provide substantially different capacities due to changed stability characteristics requiring different chart sections. Using wrong chart sections creates serious overload risks or unnecessarily limits operations with capacity actually available.

87. **Correct Answer: C (Wind effects)**

For large loads, wind effects must be considered and may require capacity reductions. Large surface areas create wind forces adding to overturning moments affecting stability. Manufacturers may specify capacity reductions for loads exceeding certain surface areas or operational restrictions when operating with large exposed loads in windy conditions.

88. **Correct Answer: B (Critical restrictions)**

Chart footnotes contain critical restrictions and conditions that apply to operations and must be followed. Footnotes provide important information including outrigger position requirements, configuration restrictions, environmental limits, and operational constraints. All footnotes must be carefully read and understood before operations ensuring full compliance.

89. **Correct Answer: C (Correct chart reference)**

When configurations change, correct chart reference is essential for safety. Each boom length, counterweight amount, outrigger position, or attachment requires consulting appropriate specific chart sections. Using wrong charts creates serious overload risks from incorrect capacity information for actual configuration potentially causing equipment failure or tipping.

90. **Correct Answer: B (Center of gravity location)**

For unbalanced loads, center of gravity location affects capacity and may require reductions. Loads with offset centers of gravity, unusual shapes, or uneven weight distribution may require capacity reductions beyond normal chart values. Load positioning and rigging must account for actual center of gravity location ensuring stability and control.

91. **Correct Answer: B (Engine-driven pump)**

Engine-driven pump converts engine power to hydraulic power. The pump draws fluid from reservoir and pressurizes it through mechanical action, converting rotational mechanical power from engine to hydraulic power in pressurized fluid. Pressurized fluid flows through system driving cylinders and motors performing work throughout crane.

92. **Correct Answer: A (Slow function or leaks)**

Slow function or leaks indicate hydraulic problems requiring investigation. Slow function suggests inadequate pressure or flow from pump wear, internal leakage, or system restrictions. External leaks show seal failure or fitting problems. Unusual noises indicate cavitation or component damage. These symptoms require immediate investigation and correction.

93. **Correct Answer: D (Remove contaminants)**

Hydraulic filters remove contaminants from fluid protecting system components from wear and damage. Filters capture particles from external contamination and internal wear debris, maintaining fluid cleanliness essential for system reliability, component longevity, and proper function. Clean fluid prevents premature component failure and maintains system efficiency.

94. **Correct Answer: A (Excessive load or poor cooling)**

Excessive load or poor cooling causes hydraulic overheating. Excessive continuous demand creates high heat generation while inadequate cooling from low fluid levels, dirty coolers, or continuous operation prevents heat dissipation. Overheating damages seals, degrades fluid properties, reduces efficiency, and can cause system failure requiring shutdown and cooling.

95. **Correct Answer: D (Maximum pressure)**

Relief valves control maximum pressure in hydraulic systems. Relief valves open automatically when pressure exceeds settings, dumping excess flow back to reservoir preventing dangerous pressure spikes. This protection prevents damage to pumps, hoses, cylinders, and other components from excessive pressure conditions that could cause catastrophic failures and injuries.

Specialty Examination

1. **Correct Answer: D (Superior stability and low ground pressure)**

Crawler cranes provide the advantage of superior stability and low ground pressure. Wide track bases create exceptional resistance to tipping through increased moment arms for stability calculations. Tracks distribute crane weight over large surface areas creating ground pressures as low as 5-15 psi allowing operations on soft soils that would not support wheeled cranes. This combination enables crawler cranes to handle heavier loads on challenging ground conditions where wheeled cranes would sink or become unstable.

2. **Correct Answer: A (Hydraulic flow control and sensors)**

On telescopic cranes, hydraulic flow control and sensors synchronize extension. Flow control valves regulate hydraulic fluid distribution to multiple extension cylinders ensuring proportional synchronized movement preventing uneven extension. Position sensors monitor actual section positions allowing control systems to adjust flow rates maintaining synchronization. This coordination prevents one section from extending ahead of others ensuring smooth controlled extension throughout boom length.

3. **Correct Answer: D (Triangulated structural framework)**

Lattice booms achieve strength advantage through triangulated structural framework. The open structure with diagonal lacing members creates efficient load paths utilizing triangulated geometry principles. This design efficiently resists both compression and tension forces while minimizing weight. Triangulation provides exceptional strength-to-weight ratios making lattice structures ideal for extreme heights and heavy capacities.

4. **Correct Answer: C (All-wheel drive and suspension)**

On all-terrain cranes, all-wheel drive and suspension enable off-road capability. All-wheel drive ensures power reaches wheels with traction even on uneven surfaces preventing stuck conditions. Advanced suspension systems adjust to ground contours maintaining wheel contact and allowing independent axle articulation. This combination enables operation on rough, soft, or unprepared terrain where standard wheeled vehicles cannot function effectively.

5. **Correct Answer: A (Modular boom section assembly)**

Lattice cranes achieve extreme heights through modular boom section assembly. Individual sections connect with pins creating continuous structures of varying lengths. Sections can be added or removed customizing boom length for specific jobs. This modularity allows configurations exceeding 400 feet for some crane models with heights adjusted by selecting and assembling appropriate section combinations for job requirements.

6. **Correct Answer: B (Holding valves and locks)**

On telescopic cranes, holding valves and locks prevent boom retraction. Hydraulic holding valves maintain pressure in extension cylinders preventing reverse flow that would cause retraction under boom weight. Mechanical locks engage at extended positions providing positive retention independent of hydraulic pressure. These dual safety systems ensure boom sections remain extended preventing dangerous uncontrolled retraction.

7. **Correct Answer: D (Simpler design with lower maintenance)**

Fixed cabs provide the advantage of simpler design with lower maintenance compared to swing cabs. Fixed cabs eliminate rotating connections for hydraulic lines, electrical systems, and controls that must function through continuous rotation and wear. This simpler design reduces maintenance requirements, potential failure points, and associated costs. No rotating seals or electrical slip rings need periodic service or replacement.

8. **Correct Answer: C (Proper pins and assembly sequence)**

When assembling lattice booms, proper pins and assembly sequence are critical. Pins must be fully inserted through all connection holes with retention devices such as clips or cotter pins properly engaged. Manufacturer assembly sequence must be followed exactly ensuring proper load paths and structural integrity. Incomplete connections or wrong sequence can cause structural failure creating catastrophic collapse during operations.

9. **Correct Answer: B (Angular support from mast)**

Boom pendants provide angular support from mast. Pendants are wire ropes connecting boom tip to mast top, supporting the boom at various angles. These ropes carry compressive boom forces in tension preventing boom collapse under its own weight and loads. Adjusting pendant length through boom hoist changes boom angle while pendants provide positive constant support.

10. **Correct Answer: A (Electronic control systems)**

On all-terrain cranes, electronic control systems manage multiple-axle steering. These sophisticated systems coordinate steering of multiple axles simultaneously based on vehicle speed, turn radius, and operator inputs. Systems can steer axles together for tight turns or independently for various maneuvers.

Advanced algorithms optimize steering angles for each axle maximizing maneuverability for different conditions and speeds.

11. **Correct Answer: D (Radius adjustment without boom movement)**

Luffing jibs offer the capability of radius adjustment without boom movement. Luffing jibs have independent angle adjustment through dedicated hoist systems allowing operators to change jib angle varying operating radius while main boom remains stationary. This capability allows radius adjustment while maintaining hook height or adjusting both parameters simultaneously for precision placement in confined spaces or around obstructions.

12. **Correct Answer: B (Offset angle)**

When using offset jibs, offset angle affects capacity. As jibs offset from straight ahead centerline positions, capacity decreases due to altered loading patterns creating side loads and increased structural stress on offset mechanisms. Charts show capacity values at various offset angles with greater offsets resulting in significantly lower capacities requiring operators to reference appropriate capacity values for actual offset being used.

13. **Correct Answer: A (Structural and stability constraints)**

Structural and stability constraints limit maximum boom length. Longer booms create greater overturning moments affecting stability and impose higher structural loads on boom members. Structural members must resist bending and compression forces without exceeding material strength limits. Manufacturers establish maximum lengths through engineering analysis ensuring adequate safety margins for both structural strength and stability throughout operating range.

14. **Correct Answer: B (Compact size with crab steering)**

Compact size with crab steering provides rough-terrain maneuverability. Compact dimensions and short wheelbase enable tight turns in restricted areas where larger cranes cannot operate. Crab steering allows rear wheels to steer opposite front wheels for minimum turn radius or in the same direction for sideways movement. This combination allows effective operation in challenging terrain and confined spaces.

15. **Correct Answer: C (Boom hoist system)**

Boom hoist system controls lattice boom angle. The boom hoist rope runs from drum over mast top sheaves through pendants to boom point. Winding rope on drum shortens pendants raising boom angle. Paying out rope lengthens pendants lowering boom angle. The mast structure provides leverage point and support for angle changes throughout operating range.

16. **Correct Answer: A (Significantly reduced)**

Fly jib capacities are significantly reduced compared to main boom capacities. Fly jibs add substantial weight at boom tip extending leverage, extend total boom length increasing structural loading, and create additional bending moments on the system. These factors combine to reduce capacity dramatically with fly jib capacities often 20-40 percent of main boom capacity at comparable radii requiring careful capacity planning and verification.

17. **Correct Answer: D (Manufacturer specifications)**

Manufacturer specifications establish safe jib length limits. Manufacturers determine maximum jib lengths through structural analysis ensuring combined boom and jib loading remains within structural capacity limits and stability is maintained throughout the operating range. Engineering analysis verifies structural members can support loads and connections are adequate for each specific configuration and loading condition.

18. **Correct Answer: C (Greater stability and capacity)**

Wider track spacing provides greater stability and capacity. Increased track width enlarges the stability base extending the moment arm for resisting overturning forces allowing higher lifting capacities before tipping limits are reached. Wide-track configurations typically provide 15-30 percent greater capacity than narrow-track settings for the same crane model due to improved stability geometry.

19. **Correct Answer: B (Quick setup without assembly)**

Quick setup without assembly is the primary telescopic crane advantage. Telescopic cranes arrive with boom mounted and extend hydraulically in minutes achieving full operational length quickly without assembly. Lattice cranes require boom section assembly taking hours or days depending on configuration. This speed advantage makes telescopic cranes ideal for projects requiring mobility between multiple locations or quick response.

20. **Correct Answer: A (Proper installation and charts)**

When using boom extensions, proper installation and charts are critical. Extensions must be installed per manufacturer specifications with all connections complete and properly secured. Appropriate load chart sections for extended configurations must be used as extensions significantly affect boom structural characteristics, weight distribution, and capacity. Both proper installation and correct chart reference are essential for safe operations.

21. **Correct Answer: D (Auxiliary hoist)**

Auxiliary hoist typically offers faster speeds than main hoists. Auxiliaries are designed for lighter loads using smaller diameter ropes and smaller drums allowing higher line speeds. Speed advantages may be 50-100 percent faster than main hoists making auxiliaries efficient for handling rigging, tools, or lighter materials. Main hoists provide greater capacity but slower speeds for heavy primary loads.

22. **Correct Answer: B (Hydraulic motor with brake)**

Hydraulic motor with brake provides hydraulic crane swing. The motor drives swing mechanism with speed proportional to control input allowing smooth acceleration and deceleration. Proportional control allows precise swing positioning for accurate load placement. Automatic brake engages when controls return to neutral stopping rotation immediately and holding position preventing drift or unwanted movement.

23. **Correct Answer: C (Appropriate capacity chart)**

When changing track width, appropriate capacity chart is essential. Wide-track and narrow-track configurations provide substantially different capacities due to different stability bases and tipping fulcrums. Different chart sections show capacities for each configuration. Using incorrect charts creates serious overload risks or unnecessarily limits operations with capacity actually available from proper configuration.

24. **Correct Answer: D (Correct installation and charts)**

When using boom inserts, correct installation and charts are critical. Inserts must be installed per manufacturer specifications with all connections complete and properly secured. Appropriate chart sections for configurations with inserts must be used as inserts affect boom structural characteristics, weight distribution, and capacity. Both proper installation and correct chart reference ensure safe operations.

25. **Correct Answer: A (Internal wear pads and guides)**

Internal wear pads and guides guide boom section telescoping. Wear pads made of low-friction materials ride on machined surfaces inside boom sections allowing smooth extension while maintaining proper alignment. These guides prevent binding and ensure sections extend concentrically without jamming, misalignment, or damage to boom surfaces ensuring reliable telescoping function throughout service life.

26. **Correct Answer: B (Main chord members)**

Main chord members carry primary loads on lattice booms. These large structural members running the full length of the boom at its corners form the primary load-carrying framework. Chords resist bending and compression forces from boom weight, loads, and operational dynamics. Lacing members and battens provide lateral support maintaining chord spacing and overall structural geometry while chords carry the primary longitudinal forces.

Practical Examination

1. **Correct Answer: D (Damage exceeding removal criteria)**

When inspecting wire rope, damage exceeding removal criteria requires immediate removal. ASME B30.5 establishes specific removal criteria including numbers of broken wires exceeding limits, diameter reduction of 7 percent or more from nominal, severe kinking, bird-caging, corrosion, or other defined deterioration. When rope condition exceeds any removal criterion, rope must be removed immediately regardless of other factors preventing catastrophic failure under load during operations.

2. **Correct Answer: C (Each shift when in regular use)**

The proper rope inspection frequency is each shift when in regular use per ASME B30.5 requirements. This daily inspection allows operators to identify rope deterioration including broken wires, kinking, wear, or corrosion before defects progress to failure levels. Frequent inspection is fundamental to rope management ensuring problems are detected early when they can be addressed safely before becoming critical hazards threatening operations.

3. **Correct Answer: B (Clean fluid at proper level)**

During pre-operational checks, clean fluid at proper level is acceptable. Hydraulic fluid should appear clear or amber depending on type, free from contamination, and maintained between minimum and maximum reservoir markings. This appearance and level indicate the system is properly serviced, adequately filled for thermal expansion, and ready for safe operations without contamination issues affecting performance or component life.

4. **Correct Answer: A (15 percent or manufacturer limit exceeded)**

When inspecting hooks, 15 percent or manufacturer limit exceeded requires replacement. Throat opening increase of 15 percent beyond original dimension or manufacturer specified limit indicates permanent stretching from overloads. ASME B30.10 establishes this removal criterion ensuring hooks are replaced before failure risk becomes unacceptable through reduced holding capability and weakened structure from permanent deformation indicating overstress conditions.

5. **Correct Answer: D (Accurate configuration and load tracking)**

Proper LMI function is indicated by accurate configuration and load tracking. The system should respond immediately to boom angle changes, radius adjustments, and load additions displaying current capacity utilization accurately reflecting actual crane configuration and loading conditions. Systems providing accurate real-time information allow effective capacity monitoring preventing overload situations through timely warnings to operators throughout operations.

6. **Correct Answer: C (Immediate stop and hold)**

During brake testing, immediate stop and hold is proper function. Properly functioning brakes engage automatically when controls return to neutral stopping movement immediately without delay and holding position without drift or movement under load. Any delay in engagement, continued coasting after control release, or inability to hold position indicates brake adjustment or repair is needed before operations continue.

7. **Correct Answer: B (Load hold without drift)**

Load hold without drift verifies hoist brake function. The proper procedure involves raising a load or unloaded hook to working height, releasing control to neutral, and verifying hoist immediately stops and holds position without drift or lowering. The automatic brake must engage instantly preventing any downward movement demonstrating proper function under actual loading conditions and gravity forces throughout the stroke.

8. **Correct Answer: C (Controls in neutral)**

Before engine start, controls in neutral is verified. Operators must physically verify all control levers are in neutral positions before starting engine. This verification prevents unintended crane movements when hydraulic systems pressurize after engine start. Physical verification of each control position ensures safe startup preventing dangerous unexpected movements that could cause injury or damage to equipment or surroundings.

9. **Correct Answer: B (Oil pressure and temperature)**

During warm-up, oil pressure and temperature are monitored. Oil pressure should stabilize quickly indicating proper lubrication system function providing adequate flow to engine and hydraulic components. Temperature gauges should show gradual warming toward operating range. Both engine coolant and hydraulic oil temperatures must reach proper levels before placing systems under full load ensuring adequate viscosity and lubrication for component protection.

10. **Correct Answer: A (Crane level maintained)**

When deploying outriggers, crane level maintained is verified. Real-time level monitoring during jack extension allows immediate adjustment of individual jack heights achieving proper level as crane lifts off tires or tracks. Most manufacturers limit out-of-level to one percent grade requiring careful monitoring and adjustment throughout the deployment process ensuring crane remains within specifications for stability calculations.

11. **Correct Answer: D (Variable speeds with brake test)**

Proper hoist testing procedure is variable speeds with brake test. Operators verify hoist responds smoothly to control inputs at slow and fast speeds demonstrating proportional control, controls return to neutral properly without sticking, brakes engage automatically when controls are released, and loads stop and

hold without drift demonstrating complete system function under various operating conditions from minimum to maximum speeds.

12. **Correct Answer: C (Smooth proportional response)**

During control testing, smooth proportional response is acceptable. Controls should respond smoothly and proportionally to operator inputs with immediate response, no delays, no binding, and no jerking. Functions should accelerate and decelerate smoothly with movements proportional to control inputs. This smooth response demonstrates proper control valve and hydraulic system function without internal wear, contamination, or mechanical problems.

13. **Correct Answer: A (Accurate length display)**

When checking boom indicators, accurate length display is verified. Indicators must accurately display actual boom length matching physically extended length within acceptable tolerances typically plus or minus one inch. These indicators are essential for capacity determination using load charts. Operators must know exact boom length to read capacities correctly making accurate indicators critical for preventing overload situations during operations.

14. **Correct Answer: D (Kinking or bird-caging)**

Kinking or bird-caging requires immediate rope removal. Kinks show permanent distortion with severe localized stress concentrations dramatically reducing rope strength at kinked locations to fractions of normal capacity. Bird-caging where strands separate from rope body forming a birdcage pattern indicates core failure and structural collapse. Either condition can cause sudden catastrophic failure under loads well below normal rated capacity.

15. **Correct Answer: A (Milky or cloudy fluid)**

During hydraulic inspection, milky or cloudy fluid indicates contamination. Milky appearance shows water contamination causing corrosion, reduced lubrication properties, and accelerated component wear. Cloudiness indicates other contaminants including dirt, wear particles, or chemical breakdown products. Contaminated fluid must be drained, system flushed, and contamination sources corrected before refilling with clean fluid preventing component damage.

16. **Correct Answer: C (Warnings and cutout activation)**

When testing anti-two-block, warnings and cutout activation indicates proper function. Visual and audible warnings should activate well before contact occurs providing operator warning to stop hoisting. Automatic hoist cutout should prevent actual two-blocking through function interruption. The device provides warning allowing operator response then prevents contact through automatic cutout protecting equipment and preventing boom damage or structural failure.

17. **Correct Answer: B (Engagement verification with load test)**

Proper lock verification is engagement verification with load test. Locks must engage properly when components reach extended or set positions with positive engagement. Testing involves attempting to move locked components against locks confirming locks prevent movement under force. Locks failing to engage properly or allowing movement despite engagement require immediate repair before operations preventing accidental retraction or movement.

18. **Correct Answer: B (Cracks or deformation)**

During structural inspection, cracks or deformation requires attention. Structural cracks in boom members, turret components, or other structural elements can propagate rapidly under load causing catastrophic failure without warning. Permanent deformation indicates loading beyond design limits compromising structural integrity. Any structural damage requires engineering evaluation before equipment can safely return to service ensuring structural soundness.

19. **Correct Answer: A (Secure attachment without loosening)**

When inspecting terminations, secure attachment without loosening is critical. Terminations must maintain full grip on rope with no loosening between rope and socket or wedge, no cracks in termination components, and no deformation indicating overstress. Any loosening compromises termination strength potentially allowing rope pullout under load requiring replacement before operations continue preventing catastrophic load drops.

20. **Correct Answer: C (Functional readable information)**

LMI displays must provide functional readable information. Displays must be operational showing appropriate capacity and configuration data including boom length, angle, radius, and capacity utilization. Information must be readable from operator's position under all lighting conditions including direct sunlight. Non-functional or illegible displays prevent capacity monitoring creating serious overload risks requiring immediate repair before operations.

21. **Correct Answer: A (Proper seating in all grooves)**

During rope inspection, proper seating in all grooves is required. Rope must seat fully in intended sheave grooves throughout entire reeving paths from drum through all sheaves to hook. Improper seating with rope running on sheave flanges causes concentrated wear on both rope and sheaves and can lead to rope jumping from sheaves during operations creating sudden load drops or equipment damage.

22. **Correct Answer: D (Cracking, bulging, or deterioration)**

When checking hoses, cracking, bulging, or deterioration requires replacement. Cracking particularly in bend areas where flexing is greatest, bulging indicating internal reinforcement failure weakening hose

structure, or other visible deterioration indicates imminent hose failure under pressure. Age-related hardening reducing flexibility also warrants replacement. Failed hoses under pressure can cause sudden loss of function or create safety hazards.

23. **Correct Answer: B (Lower boom, secure controls, document)**

Proper shutdown procedure is lower boom, secure controls, document. This sequence includes lowering boom to safe storage angle protecting from wind damage, securing all controls in neutral or off positions preventing unauthorized operation or inadvertent movements, and documenting any issues or defects requiring attention providing communication about equipment status and needed work for next operations.

24. **Correct Answer: C (Smooth operation with immediate brake)**

During swing testing, smooth operation with immediate brake indicates proper operation. Testing should show smooth acceleration responding to control without jerking, smooth operation at commanded speeds without binding or unusual noise, smooth deceleration as control reduces, and immediate brake engagement when control returns to neutral stopping rotation instantly demonstrating coordinated system function without wear or adjustment issues.

25. **Correct Answer: B (Low pressure or expired inspection)**

When inspecting extinguishers, low pressure or expired inspection requires service. Fire extinguishers must maintain proper charge pressure indicated by gauge in green zone and receive required periodic inspections documented on inspection tags. Low pressure indicates charge loss compromising effectiveness or expired inspection indicates service is overdue. Either condition means extinguishers may not function properly requiring immediate professional servicing.

26. **Correct Answer: A (Full insertion with retention devices)**

Regarding pins, full insertion with retention devices must be verified. Pins must be fully inserted through all connection holes with no gaps visible and retention devices such as clips, bolts, or cotter pins properly engaged preventing pins from backing out during operations. Partial insertion or missing retention allows pins to work out during operations causing sudden structural connection failure and potential catastrophic boom collapse.

27. **Correct Answer: D (All systems functional and area clear)**

During final verification, all systems functional and area clear is confirmed. This comprehensive verification confirms all required inspections are complete with no unresolved defects, all safety and operating systems are functional and ready for operations, and work area is clear of personnel and obstacles within operating radii, swing paths, and load zones before beginning lift operations ensuring safe startup.

28. **Correct Answer: B (Wear, cracks, or elongated holes)**

When inspecting pins, wear, cracks, or elongated holes indicates problems. Excessive wear reducing pin diameter below specifications compromises connection strength. Cracks in pin bodies indicate fatigue or overstress requiring replacement. Elongated pin holes indicate overloading, impact damage, or fatigue damage requiring boom section or structural evaluation and possible repair or replacement before returning to service preventing failure.

29. **Correct Answer: C (Smooth operation without leaks)**

Proper cylinder operation is indicated by smooth operation without leaks. Cylinders should respond proportionally to controls without binding, jerking, or hesitation throughout the full stroke, show no hydraulic leaks from rod seals, glands, or tube fittings, and produce no unusual sounds suggesting cavitation, air entrainment, or mechanical problems. Smooth consistent extension and retraction demonstrates proper internal condition and seal integrity.

30. **Correct Answer: A (Per manufacturer specifications)**

During high winds, proper crane positioning is per manufacturer specifications. Manufacturers recommend positioning that minimizes wind loading typically lowering boom to moderate angles reducing wind sail area and structural loading while maintaining adequate ground clearance. Proper positioning protects boom structure from wind-induced damage during storms while maintaining crane stability through reduced overturning moments from wind forces on boom surfaces.