EM 385-1-1, 2008
SIGNIFICANT CHANGES OVERVIEW

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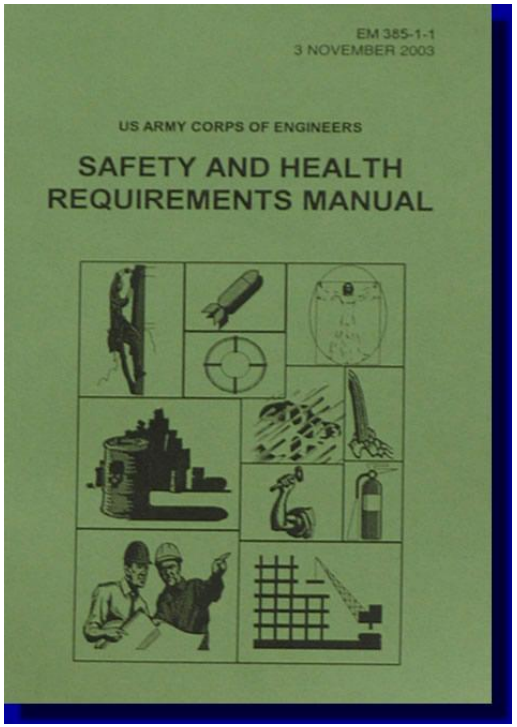
Section 16, Cranes and Hoisting Equipment through Section 34, Confined Space



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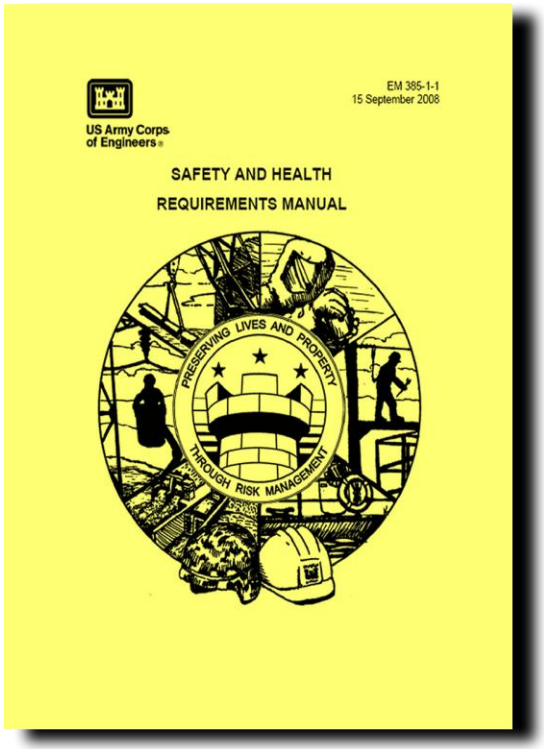

Section 16 Cranes and Hoisting Equipment

- New Title = Crane and Hoisting Equipment
- Old = Machinery and Mechanized Equipment

Section 16.A General

- MAJOR changes from 2003 version of EM 385-1-1. All of 16 is underlined.
- Rationale – Wanted a standout/stand alone section focused specifically on cranes/hoisting equipment.
- Moved Machinery/Mechanized equipment into Section 18 with other vehicles/equipment

Section 16.A General

- 16.A.01 Unless otherwise specified, the requirements of this Section are applicable to all cranes and hoisting equipment to include, but not limited to…..

Section 16.A General

- 16.A.02 Before any crane or hoisting equipment is placed in use, it shall be inspected and tested and certified in writing by a competent person to be in accordance with the manufacturer's recommendations and the requirements of this manual. See 16.D, E and F

Section 16.A General

- 16.A.03 Employer shall comply with all manufacturer's instructions, procedures, and recommendations applicable to operational functions of the equipment, including its use with attachments.
  - Safe operating speeds or loads shall not be exceeded. When they are not available, the employer shall develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments.
  - Developed by QP
  - If related to capacity, by RPE

Section 16.A General

- 16.A.04 When manufacturer's instructions or recommendations are more stringent than this manual, follow more stringent.
- 16.A.05 The use of "electronic equipment" for entertainment purposes while operating equipment is prohibited.
- 16.A.06 Some of mech equip requirements apply to cranes/hoisting equipment so they were carried over… shut down before and during fueling, glass, back-up alarms, lights, ROPs, guards, etc as applicable

Section 16.A General

- 16.A.07 Inspections or determinations of road and shoulder conditions and structures shall be made in advance to assure clearances and load capacities…
- 16.A.08 Equipment requirements… a-j define a list of mandatory requirements before we allow a piece of equipment to operate…
- 16.A.09 ROPS discussed

Section 16.A General

- 16.A.10 Discusses specifications and operating manuals for hydraulic equipment and the attachments utilizing quick connect/disconnect systems and the requirements of the operator to verify the quick connect/disconnect system is positively engaged.
- 16.A.11 Discusses all guarding and safety devices that shall be used and maintained…
  - Belt, sprocket, gears, shafts, etc…
  - Hot surfaces
  - Platforms, foot walks, steps

Section 16.A General

- 16.A.12 Work Area Control.
  - Don't get inside the radius of a rotating superstructure
- 16.A.13 Discusses controls of excavators or similar equipment with folding booms or lift arms - shall not be operated from a ground position unless so designed.
- 16.A.14 Personnel shall not work in, pass under, or ride in buckets or booms of excavators in operation.

Section 16.A General

- 16.A.15 Maintenance and repair of cranes and hoisting equipment.
  - IAW the manufacturer's recommendations
  - Available to GDA upon request
  - Shut down and positive means taken to prevent operation during the maintenance process
  - Performed in an area that protects repair personnel from traffic
  - Blocking and cribbing requirements during maintenance and repair.

Section 16.B Personnel Qualifications

- 16.B.01 Emphasizes that all equipment shall be operated by designated qualified personnel.
  - It requires that personnel qualification shall be in writing.
  - It then discusses…Trainees, Maintenance personnel and Inspectors who may be authorized to operate the equipment under limited conditions.

Section 16.B Personnel Qualifications

- 16.B.02 Crane Operator Requirements
  - Discusses the effective communication by the Crane Operator rigger, flagmen, etc;
  - Written quals to GDA before work starts
  - Quals by written/practical testing
  - Knowledge of operator's manual and USACE requirements
  - Ability to read, write, comprehend in language of manufacturer's materials; other skills

Section 16.B Personnel Qualifications

– 16.B.03 Qualifications and/or certifications. Crane operators shall possess at least one of the following licenses or certifications (gives 4 Options):

Section 16.B Personnel Qualifications

- **16.B.02 Option 1…A current certification by an accredited (nationally recognized accrediting agency) crane/derrick operator testing organization. The organization shall….**
- (1) Administer written and practical tests that assess operator applicants regarding necessary knowledge and skills;
- (2) Provide different levels of certification based on equipment capacity and type.
- (3) Have procedures for operators to re-apply and be retested in event operator applicant fails a test or is decertified;
- (4) Have testing procedures for recertification;
- (5) Have accreditation reviewed by the nationally recognized accrediting agency at least every 3 years.
- (6) A certification issued under this option is portable and

Section 16.B Personnel Qualifications

- 16.B.02 Option 2…**Qualification by a professional source** that qualifies crane operators (e.g., independent testing and qualifying company, a union, or a qualified consultant who can be an in-house resource) as long as the program is an audited employer program. Employer's qualification of its employee shall meet the following:

Section 16.B Personnel Qualifications
Option 2 (cont'd)

- (1) Administer written and practical tests that assess operator applicants regarding necessary knowledge and skills... either developed by an accredited crane/derrick operator testing organization (see Option 1 above) OR approved by an examiner in accordance with the following:
  - (a) The examiner is certified to evaluate such tests by an accredited crane/derrick operator testing organization (see Option 1 above);
  - (b) The approval shall be based on the examiner's determination that the tests meet nationally recognized test development criteria and are valid and reliable in assessing the operator applicant's knowledge and skill needed;

Section 16.B Personnel Qualifications
Option 2 (cont'd)

- (2) The employer program shall be audited within 3 months of the beginning of the program and every 3 years thereafter;
- (3) The employer program shall have testing procedures for recertification;
- (4) Any significant deficiencies identified by the examiner shall be corrected prior to further qualification of any operators;
- (5) Records of audits shall be retained for 3 years and made available to the GDA upon request;
- (6) A qualification under this option is non-portable and is valid for 5 years from date of issuance.

Section 16.B Personnel Qualifications
Option 3

(3) **Option 3. Qualification by the U.S. Military**.

Operator qualification is considered valid if he/she has a current operator qualification issued by the U.S. military for operation of the equipment. Qualification meets operator qualification requirements of this section for operation of equipment only within the jurisdiction of the government entity and is valid for the period stipulated but no longer than 5 years from issuance.

Section 16.B Personnel Qualifications
Option 4

- **Option 4. Licensing by a Government Entity.** An examiner that issues operator licenses for operating equipment is considered a government accredited crane/derrick operator examiner if the following criteria are met:
  - (1) The requirements for obtaining the license include an assessment by written and practical tests of the operator applicant regarding knowledge and skills, as applicable to the specific type of equipment the individual will operate.
  - (2) The testing meets industry recognized criteria for written testing materials, practical examinations, test administration, grading, facilities/equipment and personnel. Testing shall include:

Section 16.B Personnel Qualifications
Option 4

(3) The government authority that oversees the examiners has determined that the requirements for Option 4 licensing have been met.

(4) The examiner has testing procedures for recertification designed to ensure that the operator continues to meet the technical knowledge and skills requirements.

Section 16.B Personnel Qualifications
Option 4

- (5) A license issued by an examiner that meets the requirements of this Option:
  - (a) Meets operator qualification requirements of this section for operation of equipment only within the jurisdiction of the government entity.
  - (b) Is valid for the period stipulated but no longer than 5 years from issuance.

Section 16.B Personnel Qualifications

- 16.B.04 USACE Examiner Qualifications
  - It is recommended that each USACE Command select in-house crane examiners and the individuals be designated in writing.
  - a. Examiners shall be trained and licensed or certified by a commercial qualifying/certifying organization.
  - b. Examiners will examine, qualify and certify the Command's crane operators based on criteria in this section.
  - c. For Commands with few crane operators, where an in-house examiner would not be cost effective, operators should be examined, qualified or certified by a commercial qualifying/certifying organization.

Section 16.B Personnel Qualifications

- 16.B.05 Operator Practical Examination Requirements
  - Crane operators shall pass a practical operational test that demonstrates their ability to perform the following:
  - a thru h discusses the practical examination.

Section 16.B Personnel Qualifications

- 16.B.06 Operator Physical Examination Requirements – within past 2 years;
  - Pretty much what you saw in the 2003 version of the manual except new requirement that they have a negative result for substance abuse test.
- 16.B.07 Signal Person Qualifications
  - The signal person must be qualified by either a third party qualified evaluator or the employer's qualified evaluator.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- Applies only to USACE-Owned and Operated Cranes and Hoists
- 16.C.01.a. - Class I : mobile and locomotive cranes, hammerhead, portal, tower, derricks (post or stiff leg), floating or barge mounted cranes/derricks, overhead, gantry, bridge, underhung, monorail.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- 16.C.01.a Class I - May perform critical lifts, preventative maintenance and inspections as required on specific equipment as trained:
  - Training must be, as a minimum:
  - (a) Initial: 24-hour training with written and practical/operational examinations;
  - (b) Annual: 8-hour refresher training, to include practical/operational examination.

Section 16.C Classification of Equipment and Training of Operators – (USACE-Owned & Operated Only)

- 16.C.01.b - Class II cranes are overhead, bridge and gantry cranes, underhung, monorail, pedestal and wall-mounted jib cranes, and similar.
  - Class II operators are NOT permitted to perform critical lifts
  - May perform preventative maintenance and inspections as required on specific equipment as trained

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Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- 16.C.01 Class II…
  - Training must be, as a minimum:
    - (a) Initial: 8-hour training with written and practical/operational examinations;
    - (b) Annual: 1-hour refresher training, to include practical/operational examination.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- 16.C.01.c Class IIIA: Hoisting Equipment:
  - c. **Class IIIA Hoisting Equipment:** greater than 10 tons (>10T rated capacity), and shop equipment used for lifting or lowering a freely suspended (unguided) loads.
  - Class IIIA operators are qualified to operate, perform preventive maintenance and inspection of this equipment as required.

Section 16 Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- (2) Class IIIA training, must be on the specific type(s) of hoist operated and be, as a minimum:
- (a) Initial: 4-hour training with written (as applicable, see 16.B.03.d) and practical/operational examinations;
- (b) Annual: 1-hour refresher training, to include practical/operational examination.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- 16.C.01 Class IIIB: Hoisting Equipment.
  - Up to and including10 Tons (rated capacity) and shop equipment used for lifting or lowering freely suspended (unguided) loads. Training must be on the specific type(s) of hoist operated…
  - (1) Class IIIB operators are qualified to operate, perform preventive maintenance and inspection of this equipment as required.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

– Class IIIB training must be on the safe operation and use of the hoist and be, as a minimum:

(a) Initial: 1-hour training with written (as applicable, see 16.B.03.d) and practical/operational examinations;

(b) Annual: 1-hour refresher training, to include practical/operational examination.

Section 16.C Classification of Equipment and Training of Operators (USACE-Owned & Operated Only)

- 16.C.02 Discusses the re-issuance of qualification, crane and hoisting equipment operators mush have attended applicable initial and annual training and passed the written/operational exam requirements above. 16.C.03 Each USACE activity or operating project will maintain a current list of operators, complete crane and hoisting equipment training records for each operator, and a list of equipment that each operator is qualified to operate.

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- 16.D.01 Inspection criteria shall be IAW this section, applicable ASME standards, OSHA regulations and the manufacturer's recommendations
- 16.D.02 Recordkeeping requirements.
- 16.D.03 GDA notification for equipment entering the site (24-hours prior)
- 16.D.04 Taking unsafe equipment out of service.

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- 16.D.05 Cranes and Derricks in Regular Service. Breaks inspections procedures into three categories:
  - Periodic
  - Start Up
  - Frequent
- 16.D.06 thru 16.D.10 defines these classifications.

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- NOTE…All tables and appendices (F, G, H, K) have been brought forward and inserted into their rightful place within the body of Section 16.

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- 16.D.11 Inspection of Cranes, Derricks and other Hoisting Equipment not in regular use.
  - Frequent
  - Periodic
  - Exposed to adverse environmental conditions shall be inspected more frequently as determined by a qualified person (GDA for example or the contractor)

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- 16.D.12 Wire Rope Inspection, Maintenance and Replacement
  - Competent person conducts the inspection
  - Visual inspection criteria
  - Broken down into Categories I thru III as to criticality to operations and required actions.
  - References table 16-2 (new) – Wire Rope Removal and Replacement Criteria
  - Critical Review items (subsection e) draws inspector to pay particular attention to certain deficiencies in the wire rope

Section 16.D Inspection Criteria for Cranes and Hoisting Equipment

- 16.D.12 Wire Rope Inspection, Maintenance and Replacement
  - f. Removal from Service. Sets out criteria for the inspection by which wire rope can be removed from service.
  - Uses the same categories as defined earlier (I thru III) and provides the reader with Table 16-2 which is the ASME standard and identifies:
    - # of broken wires in running ropes
    - # of broken wires in standing ropes

Section 16.E Safety Devices and Operational Aids

- 16.E.01 Lists safety devices (versus "operational aids"):
  - Crane level indicator
  - Boom stops
  - Jib stops
  - Hydraulic Outrigger jacks
  - etc

Section 16.E Safety Devices and Operational Aids

- 16.E.02 Proper Operation of Safety Devices
  - Operations don't begin until this equipment has been checked and verified to be safe for operations – no alternative measure allowed
- 16.E.03 Operational Aids
  - This section breaks down by Category, those operational aids that shall be on ALL cranes and derricks covered by Section 16 unless otherwise specified but allows alternative measure in such instances

Section 16.E Safety Devices and Operational Aids

- 16.E.03 – cont'd
  - EXCEPTION 1 – Duty Cycle: Lattice boom cranes that are used exclusively for duty cycle operations are exempted from A2B equipment requirements.
  - It goes on to discuss that when a lattice boom crane engaged in duty cycle work is required to make a non-duty cycle lift (lifting a piece of equipment), it will be exempt from the A2B requirements if the following procedures are implemented.
  - Listed….

Section 16.E Safety Devices and Operational Aids

- 16.E.03 – cont'd
  - EXCEPTION 2 – Lattice boom cranes with manually operated friction brakes. Lattice boom crane and hoisting equipment with manually activated friction brakes, A2B warning devices may be used in lieu of A2B prevention devices.
  - Listed

Section 16.F Testing

- 16.F.01 Written reports of testing
- 16.F.02 Operational Testing
  - A qualified person shall conduct operational tests IAW ANSI/ASME and the manufacturer's recommendations. If the Manufacturer has no procedures, reference Appendix I (same as in 03)

Section 16.F Testing

- 16.F.03 Load Testing
  - a. Performed IAW ANSI/ASME and manufacturer's recommendations by, or under the direction of a qualified person.
  - If the manufacturer has no procedures, a Registered Professional Engineer familiar with the type of equipment involved must approve procedures and frequency of testing using as a minimum Appendix 1.

Section 16.F Testing

- 16.F.03 Load Testing
  - b. Test loads shall be made at 110% of the anticipated load for the specified configuration, not to exceed 100% of the manufacturer's load rating at the configuration of the test, except for manufacturer testing of new crane and hoisting equipment, which shall be conducted IAW ANSI/ASME standards B30.1 through B30.17, as appropriate…
  - Overhead/gantry's at 125%

Section 16.F Testing

- 16.F.03 Load Testing
  - c. Load Testing shall be performed:
  - (1) Before initial use of crane or hoisting equipment in which a load bearing or load controlling part or component, brake, travel component or clutch has been altered, replaced, or repaired.
  - (2) Every time the crane or hoisting equipment is reconfigured or reassembled after disassembly (to include booms)
  - (3) When the manufacturer requires load testing. (replaces 4-year interval requirement)

Employer/crane owner must perform survey of all cranes/hoisting equipment and maintain documentation of load testing – to include manufacturer recommended interval

Section 16.G Operation

- 16.G.01 All cranes and hoisting equipment shall have the following documents with them (in the cab, if applicable) at all times when they are to be operated
  - List of documents in a thru e.
- 16.G.02 No modifications or additions that affect the capacity or safe operation of cranes or hoisting equipment shall be made without the manufacturer's written approval.

Section 16.G Operation

- 16.G.03 Hoisting wire ropes shall be installed IAW ANSI/ASME standards and the equipment manufacturer's recommendations.
- 16.G.04 Minimum Operator Responsibilities
  - shall not engage in any activity that will divert his attention while operating the equipment;
  - shall not leave the controls while a load is suspended;

Section 16.G Operation

- Before leaving the crane or hoisting equipment unattended, the operator shall:
  - Land any load, bucket, lifting magnet, or other device;
  - Disengage the master clutch;
  - Set travel, swing, boom brakes, and other locking devices;
  - Put the controls in the “OFF” or neutral position;
  - Secure the equipment against accidental travel; and
  - Stop the engine.
- **(g) Exception:** When crane operation is frequently interrupted during a shift and the operator must leave the crane…

16.G Operation

- The operator shall respond to signals from the person who is directing the lift or an appointed signal person. When a signal person is not used in the crane operation, operator shall ensure he has full view of load/load travel paths at all times load is rigged to crane and hoisting equipment;
- ..is responsible for those operations under his direct control. Whenever there is a concern as to safety, the operator shall have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

16.G. Operations

- b. The operator, qualified lift supervisor and rigger shall jointly ensure that:
- (1) The crane is level and, where necessary, blocked;
- (2) The load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches;
- (3) The lift and swing path is clear of obstructions and adequate clearance is maintained from electrical sources per Table 16-3; and
- (4) All persons are clear of the swing radius of the counterweight.

16.G Operations

- c. When two or more cranes (tandem lift is a critical lift) are used to lift one load, the lift supervisor shall be responsible for the following:
- (1) Analyzing the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made;
- (2) Making determinations as necessary to reduce crane ratings, load position, boom location, ground support, and speed of movement, which are required to safely make the lift;
- (3) Ensuring that dedicated personnel are present and equipment is functioning properly. All personnel involved with the crane operation shall understand the communication systems and their responsibilities….

Section 16.G Operation

- 16.G.05 Communications
  - a. Discusses the standard signaling system that shall be used (Figure 16-1)
  - b. Defines situations where a signal person MUST be used.
    - Point of Operation is out of view of the operator
    - When direction of travel is obstructed
    - When the operator or person handling the load deem it necessary

Section 16.G Operation

- 16.G.06 Riding on loads, hooks, hammers, buckets, material hoists, or other hoisting equipment not meant for personnel handling is prohibited
- Figure 16-1 (same as in Section 11)
- 16.G.07 Taglines
- 16.G.08 Slack line condition…properly seat the rope in the sheaves and on the drum…

Section 16.G Operation

- 16.G.09 Clearances
  - a. Power line clearance. Identifies the typical work zone clearance (360° around the crane). …If operated up to the crane's maximum working radius in the work zone could get within 20 ft of the powerline…one of the following options must be met:
    - Deenergize and ground
    - Use Table 16-3
    - Follow NFPA 70

Section 16.G Operation

- 16.G.09 Clearances
  - b. Physical Clearances
  - (1) Adequate clearance shall be maintained between moving and rotating structures of the crane and hoisting equipment (minimum = 24 inches)
  - (2) Accessible area within the swing radius…talks about barricades to prevent an employee from getting where they don't belong
  - (3) Nobody permitted to work under any suspended loads. EXCEPTION – initial connection/unhooking of steel…or employees unhooking a load.

Section 16.H Critical Lifts

- 16.H.01 Defines the following as critical lifts requiring detailed planning and additional or unusual safety precautions. Critical lifts are defined as:
- a. Lifts involving hazardous materials (explosives, highly volatile substances)
- b. Hoisting personnel with a crane or hoist
- c. Lifts made with more than one crane
- d. Lifts where the center of gravity could change

Section 16.H Critical Lifts

- e. Lifts the operator believes should be considered critical;
- f. Lifts made when the load weight is 75% of the rated capacity of the crane load chart or more (not applicable to gantry, overhead or bridge cranes);
- g. Lifts without the use of outriggers using rubber tire load charts;
- h. Lifts using more than one hoist on the same crane or trolleys;

16.H Critical Lifts

- i. Lifts involving non-routine or technically difficult rigging arrangement (to include lifts involving Multiple Lift Rigging;
- j. Lifts involving submerged loads (EXCEPTION: lifts that were engineered to travel in guided slots throughout the lift and have fixed rigging and/or lifting beams, i.e., intake gates, roller gates, tailgates/logs,);
- k. Lifts out of the operator's view; **EXCEPTION: if hand signals via a signal person in view of the operator or radio communications are available and in use, load does not exceed two tons AND is determined a routine lift by the lift supervisor.**

Section 16.H Critical Lifts

- 16.H.02 Critical lift plans, developed:
  - a. By a qualified person and shall include the crane operator, lift supervisor, and the rigger….
  - b. For a series of lifts on one project or job, as long as the cranes, personnel, type loads and configuration do not
  - c. Documentation requirements
  - d. Minimum requirements of the plan shall include, as a minimum. Steps 1 thru 11 are identified.

Section 16.I Environmental Considerations

- 16.I.01 Projects shall have adequate means to monitor weather conditions, including a wind-indicating device
- 16.I.02 Cranes shall not be operated when wind speeds at the site attain the maximum wind velocity recommendations of the manufacturer. At winds greater than 20 mph, operator, rigger, and lift supervisor shall cease all crane operations, evaluate conditions and determine if the lift shall proceed. The determination to proceed or not shall be documented in the crane operator's logbook

Section 16.I Environmental Considerations

- 16.I.03 Storm warning issuance and how to determine whether to continue or not.
- 16.I.04 Reducing operational and functional speeds during inclement (icing) weather.
- 16.I.05 When conditions such as lightning are observed….
- 16.I.06 For night operations…adequate lighting (see Section 7)

Section 16.J Lattice, Hydraulic, Crawler, Truck, Wheel and Ringer Mounted Cranes

- 16.J.02 Requirements for boom assembly and disassembly (no significant changes)
- 16.J.03 Outriggers (no significant changes)
- 16.J.04 Unless the manufacturer has specified an on-rubber rating, mobile cranes shall not pick or swing loads over the side of the crane unless the outriggers are down and fully extended.

Section 16.J Lattice, Hydraulic, Crawler, Truck, Wheel and Ringer Mounted Cranes

- 16.J.05 Unless recommended against by the manufacturer, crane booms shall be lowered to ground level or secured against displacement by wind loads or other forces….
- 16.J.06 When pick and carry operations are required, the boom must be centered over the front of the crane, swing lock engaged….

Section 16.K Portal, Tower, and Pillar Cranes

- 16.K.01 Load and bearing analysis requirements (by RPE)
- 16.K.02 Erected/dismantled in accordance with manufacturer's recommendation – under QP direction
- 16.K.03 Pre-operational testing (IAW B30.3)
- 16.K.04 Climbing procedures identified
- 16.K.05 Safety devices and operational aids

Section 16.K Portal, Tower, and Pillar Cranes

- 16.K.06 Multiple tower crane jobsites.
  - Cranes shall be located such that no crane may come into contact with a structure or another crane.
  - Cranes permitted to pass over one another.
- 16.K.07 Weathervaning. Tower cranes required to weathervane when out-of-service shall be installed with clearance for boom and super tow swing through a full 360 degree arc with striking any fixed object or other weathervaning crane.

Section 16.L Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard Mounted Cranes

- 16.L.01 The requirements of this section are supplemental requirements….unless otherwise specified.
- 16.L.02 Discusses the load rating of a floating crane/derrick as determined by the manufacturer or qualified person.
  - (1) Naval Architect Notes: (defined)

Section 16.L Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard Mounted Cranes

- 16.L.04 Floating cranes/derricks intended for permanent attachment to a barge, pontoon or other means of floatation shall be designed IAW 46 CFR 173.005 through 173.025.
  - List of requirements provided
  - (4) Maximum allowable list and trim for the barge, pontoon, or other means of flotation shall not exceed the amount necessary to insure:
  - (a) All deck surfaces of the barge, pontoon or flotation device shall be above the water;
  - (b) The entire bottom area of the barge, pontoon or flotation device shall be submerged;

Section 16.L Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard Mounted Cranes

- 16.L.04 Physical Attachment
- 16.L.05 Safety Devices/Operational Aids in addition to previously required
- 16.L.09 Operations
  - a thru e describe operational procedures to monitor and maintain during normal operations.

Section 16.L Floating Cranes/Derricks, etc

- 16.L.10 All lifts must be planned to avoid procedures that could result in configurations where the operator cannot maintain safe control of the lift. (A plan, in this case, might be a quick discussion with the deck crew, and a verification of the proposed operation.) Lifts shall reflect floating operational parameters such as: anticipated values for wire leads, unknown load for extractions, and upper limits on crane force.
- 16.L.11 Mobile Auxiliary Cranes
- 16.L.12 Anchor handling barge/vessel section is added to the manual

Section 16.M Overhead and Gantry Cranes

- No Significant Changes

Section 16.N Monorails and Underhung Cranes

- 16.N No significant changes to this section

Section 16.O Derricks

- 16.O No significant changes to this section

Section 16.P Handling Loads Suspended from Rotorcraft

- 16.P This section has been expanded and aligns with common terminology found in the ASME standards.
- New hand signals diagram

Section 16.Q Material Hoists

- 16.Q This section is moved to the back of Section 16 to better identify the requirement, roles and responsibilities of personnel engaged in the operation and maintenance of material hoists.

Section 16.R Pile Drivers

- Some changes for clarification
- Discusses the requirements of other duty cycle operations and highlights the requirements of pile driving and extracting operations.

Section 16.S Hydraulic Excavators, Wheel/Truck/Backhoe Loaders Used to Transport or Hoist Loads with Rigging

- Allowance of use of hydraulic excavating equipment for the purposes of hoisting materials was added to 2003 EM as an interim change in 2005
- 16.S.01 Hydraulic excavating equipment shall not be used to hoist personnel. The riding of personnel on loads, hooks, hammers, buckets or any other hydraulic excavating equipment is prohibited.

Section 16.S Hydraulic Excavators, Wheel/Truck/Backhoe Loaders Used to Transport or Hoist Loads with Rigging

- 16.S.02 Hydraulic excavating equipment may only be used to transport or hoist loads if allowed by the equipment manufacturer.
- 16.S.03 through 16.S.06 describes the operations, testing procedures, rigging, and maintenance of the above-referenced equipment.

Section 16.T Crane-Supported Personnel (work) Platforms

- 16.T - new section that has been moved into Section 16 from Section 22.
- This section was previously located in the Fall Protection standards and the decision was made, because of the crane support aspect, to move here.

Section 16.T Crane-Supported Work Platforms

- 16.T.10 Personnel Fall Protection.
- a. For work over water, see section 21.N for fall protection and PFD requirements. Lifesaving equipment and safety skiffs meeting the requirements of this manual shall be available.
- b. When NOT working over water, all employees occupying the work platform shall use a properly anchored personal fall protection (arrest or restraint) system. The system shall be attached to a structural member within the platform.
- (1) The attachment points to which personal fall arrest or restraint systems are attached on the platform must meet the anchorage requirements in Section 21.
-

Section 16.T Work-Supported Work Platforms

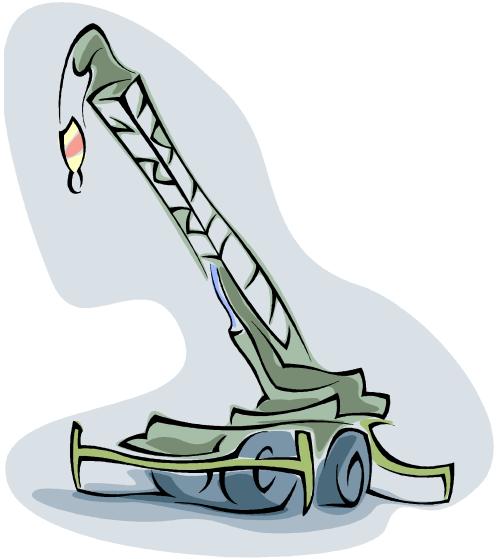
- (2) Depending on the type of work to be done and the height of the work platform above a lower surface, all workers shall wear a full-body harness as part of a fall arrest or fall restraint system. The competent person for fall protection on-site will assess each situation and determine which system would best fit the current work requirement and be in accordance with the crane manufacturer's instructions and recommendations. Particular attention should be paid to anchor points and capacities.

Section 16.T Work-Supported Work Platform

- (3) Workers working from the platform suspended from a crane are permitted to be tied off to the lower load block or overhaul ball. An AHA shall be developed to details on how work will be safely performed. AHA must be submitted to the GDA for acceptance

Section 16 - Figures

- Some Figures, Pictograms, Tables have been moved from Appendices F, G, H, J, etc in 2003 EM385-1-1 and incorporated into the body of Section 16.
- ASME/ANSI copyright/permission to print so only few pictures from appendices



QUESTIONS?

Section 17 Conveyors

17.A.02.a.The entire system shall be visually inspected daily before start up. – **ADDED**

17.A.03.b. Conveyor systems shall be equipped with a time-delay audible and visual warning signal to be sounded immediately

before starting of the conveyor. **- ADDED**

Section 17 Conveyors

17.A.03.d. The safety devices shall be designed to prevent the conveyor from restarting until the safety device is manually reset. – **ADDED**

17.A.04.i. The build up of excess material shall be removed from all points along the conveyor. **- NEW**

Section 17 Conveyors

17.A.06.c. If a multi-conveyor system, the emergency stop shall stop all conveyors that are tied together. – **NEW**

17.A.13.b. Dump hoppers having the hopper flush with the floor and which by their use cannot be guarded shall be equipped with grating having a maximum opening of **4 in (10 cm)** and heavy enough to withstand any load which may be imposed on it. **– 4 in (10cm) ADDED**

Section 18

NEW TITLE: Motor Vehicles, Machinery And Mechanized Equipment, All Terrain Vehicles, Utility Vehicles, & Specialty Vehicles

Several Significant Changes

Section 18

- Machinery And Mechanized Equipment moved from Section 16 to Section 18.G
- Added Sub-Sections for Utility Vehicles & Specialty Vehicles
- Moved Section “18.E Aircraft” to Section “32.B Aircraft”
- Section 32 becomes Airfield and Aircraft Operations – logical sequence of topic material

Section 18.A

• 18.A.02 Every person operating a motor vehicle shall possess, at all times while operating such vehicle, a license/permit valid for the equipment being operated. Licensing will be as per Service regulation for military personnel and State regulations for civilian personnel, to include contractors. Operator must present the license/permit to the GDA upon request.

> USACE equipment/vehicle operators: In lieu of a license/permit, an operator equipment qualification record (OF 346) shall be maintained on file for all USACE vehicle/equipment operators.

Section 18.B

18.B.01.e. & f. Back-up Alarms (2 new paragraphs)

e. Commercial cargo vehicles such as pick-up trucks, utility cargo/tool trucks, and flat bed cargo trucks intended for use on public highways with a normally clear view through the rear window are not required to have backup alarms. If the view to the rear is temporarily obstructed by a load or permanently blocked by a utility/tool box body or other modification, then a signal person/observer to back up must be used or a backup alarm must be installed.

f. The removal or disabling of any backup alarm is strictly prohibited.

Section 18.C

• 18.C.01 Defines USACE Motor Vehicle -USACE motor vehicle is any vehicle (government-owned; POV or Rental Car if being used while on-duty in lieu of government-owned vehicle) used to transport Government employees.

•The use of any portable headphones, earphones, or other listening devices (except for hands–free cellular phones) while operating USACE motor vehicles **or contractor** motor vehicles (being used on USACE projects) is prohibited.

Section 18.C

- GPS Systems. GPS systems shall be mounted within the vehicle so that they do not create sight hazards for the operator. Programming of dashboard GPS systems while driving is prohibited. The use of non-mounted GPS systems may only be used by the vehicle operator while the vehicle is in a stopped position. NEW
- Operators of USACE motor vehicles (whether government or contractor personnel) **being used on USACE projects** shall not eat, drink, or smoke while the vehicle is in motion

18.C

- 18.C.15 When a bus, truck, or truck-trailer combination is parked or disabled on a highway or the adjacent shoulder, yellow flashing lights and other traffic warning devices (cones, flags, signs, etc) per 49 CFR 571.5 shall be used during the daytime and reflector, flares, electric lights or other effective means of identification shall be displayed at night.

18.C

- 18.C.17 Maintenance Vehicles. All maintenance vehicles that are used at USACE recreational areas (or projects) shall be provided with two 28 in (0.7 m) day glow/high-visibility orange traffic cones. Vehicle operators that operate maintenance vehicles in USACE recreational areas shall place a cone in front and behind the vehicle when parked, remove and place in vehicle prior to departure.

Section 18.E

18.E.01 Defines motor vehicle as a sedan, van, SUV, truck, motorcycle, or other mode of conveyance intended for use on public roadways. This includes construction equipment that is driven on public highways. Other types of equipment such as machinery and mechanized equipment, all terrain vehicles, utility vehicles and other specialty vehicles are addressed later in this section.

Section 18.G

18.G.01

Defines machinery & mechanized equipment as equipment intended for use on construction sites or industrial sites and not intended for operations on public highways. Equipment such as dump trucks, cargo trucks, and other vehicles that may also travel on public roadways must also meet the requirements of 18.D above

18.G

- 18.G.06 Machinery and mechanized equipment shall be operated only by designated qualified personnel.
- e. USACE in-house equipment licensing examiners must be qualified to operate the equipment on which they are qualifying others (bulldozers, tractors, backhoes, etc.).
- (1) These examiners may not license themselves, but instead, must be licensed by another qualified examiner.
- (2) All licensing/qualification of equipment operators by examiners must include, at a minimum, requirements of this section, the manufacturer's instructions and recommendations as well as observation of a practical operating examination on the equipment.

Section 18.H Drilling Operations

18.H.01 Provides statement of applicability. The requirements of this section are in addition to other requirements identified in Section 18 and are applicable to rock, soil, and concrete drilling operations.

Section 18.I All Terrain Vehicles (ATVs)

- Provides definition – distinguishes them from Utility and or other Service, Specialty vehicles
- Clarified training requirements
  - ATV Operator training/certification
  - Provides in-house trainer requirements for certification and maintenance of certification

Kawasaki
MULE
3010

Section 18.J Utility Vehicles

- New Section for these vehicles; definition; examples: Rangers, Rhino, M-Gators, Gators, Mules

- Provides training requirements, PPE, etc.

Section 18.K Specialty Vehicles

- New Section – better delineation between vehicle types and their individual requirements

- Specialty vehicles are defined as all other vehicles not meeting any of the definitions above and may include burden or personnel carriers or custom vehicles (i.e., Taylor-Dunn/Cushman), golf carts, Segway HT, and snow machines, etc.

- Provides training, PPE, other requirements

Section 19 Floating Plant and Marine Activities

- 19.A.03.d. USCG approved PFD (Types I, II, III, or V) shall be worn by all personnel on decks exposed to severe weather, regardless of other safety devices used. USCG-approved Type V automatic inflatable PFDs rated for commercial use may be worn by workers on USACE sites per 05.H.02.

19.A.07 General

- NEW REQUIREMENT

- m. When three or more floating plant are configured for stationary work, a competent person shall identify any openings between decks of stationary vessels or vessels and other structures that create fully enclosed water areas (duck ponds) into which personnel can fall. If such openings are detected, means shall be taken to protect personnel from the hazard.

19.A.07

- (1) When practical, duck pond protection will consist of guardrails, nets or other physical barriers to prevent employees from falling into the openings.

- (2) When physical barriers are not practical, ladders and life rings shall be installed in each enclosed water area to allow personnel to self-rescue. Ladders may be a rigid type or Jacob's ladder, and must be securely anchored to the vessel or structure. Life rings shall have a sufficient length of rope to allow them to float on the water surface and the rope shall be securely anchored to the vessel. The number and placement of ladders and life rings shall be sufficient so that the maximum swimming distance to them is no more than 25 feet. Ladders and life rings may be retracted during reconfiguration or movement of plant.

19.C MARINE FALL PROTECTION SYSTEMS

- 19.C.01 On all decks or work surfaces 6 ft (1.8 m) or more above the main deck or 6 ft or more above adjacent vessel decks, docks, or other hard surfaces, Railing Type A or Type B, as described in Section 19.E, or bulwarks, coamings, or other structures meeting the height and strength requirements of these railing systems shall be provided except as excluded in 19.C.03 and 19.C.04.

19.C MARINE FALL PROTECTION SYSTEMS

- 19.C.02 Deck edge toe boards not less than 3.5 in (8.75 cm) high for Type A and 2 in (5 cm) high for Type B railings shall be provided when the railings are used for fall protection. Toe boards shall meet the strength requirements in section 21.B.02.d. Scuppers and/ or drainage holes may be installed as needed as long as the top edge of the toeboard is intact and the strength requirements are retained.

19.C MARINE FALL PROTECTION SYSTEMS

- 19.C.03 Personal Fall Protection Systems meeting the requirements of Section 21.C. may be used when railing systems are not installed.
- 19.C.04 Railing Systems and Personal Fall Protection Systems are not considered feasible on the main deck of vessels that perform duty cycle material loading and unloading operations from barges, scows or other vessels alongside.

Section 19.D Main Deck Perimeter Protection

- 19.D.01 Main deck perimeter protection systems are intended to provide protection against falling overboard. Main deck perimeter protection is required on all manned vessels, except where excluded in Section 19.D.05.

Section 19.D

- Unmanned vessels do not require perimeter protection, however, fall protection shall be provided where the vessel configuration and operation exposes personnel to falls onto a hard surface from vertical distances greater than 6 ft (1.8 m).

Section 19

- a. Manned vessels are vessels that operate with crews, or quartered personnel, or that have work areas that are occupied by assigned personnel during normal work activities.

- b. Unmanned vessels are typically those that carry cargo such as materials, supplies, equipment, or liquids, and do not have personnel on board except during loading and unloading and during short term operations such as tie-down, inspections, etc.

19.D.05 Areas where perimeter protection may be omitted/temporarily removed:

- a. Deck perimeter rails may be omitted from deck work areas specifically intended for line handling, working over the side of the vessel, load handling operations and designated boarding areas. Railings in these areas may obstruct work or access and present additional hazards such as pinch points against railings. Such deck edge areas may include those for line handling, fleeting scows, mooring vessels, towing, pile driving activities, and handling or placing of construction materials and equipment, pipelines, and anchors.

19.D.05 Areas where perimeter protection may be omitted/temporarily removed:

- b. Deck perimeter rails may be omitted from main deck areas where the overall walkway width is less than 24 in (.6 m) between deck structures/ permanent equipment and the deck edge.

19.D.05 Areas where perimeter protection may be omitted/temporarily removed:

- c. Removable perimeter rail sections may be installed in areas where activities such as working over the side of the vessel or loading operations are not normally performed. These rails shall be maintained in place when vessel operations do not include activity in these areas or during periods of tie-up or inactivity

19.I NAVIGATION LOCKS AND LOCKING

- 19.I.01 Smoking, open flames , or other ignition sources shall be prohibited on lock structures within 50 ft (15.2 m) of vessels containing hazardous cargos of flammable or other hazardous materials (“Red Flag” vessels) during approach and lockage.
- a. When construction, maintenance, and other non-navigational related activities are taking place on or adjacent to the lock structure, the Lock Master will relay information to supervisory personnel in these activities regarding the approach and passage of Red Flag vessels.

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19.I NAVIGATION LOCKS AND LOCKING

b. The Lock Master or Work Crew supervisor may suspend hot work at their discretion during the approach and passage of Red Flag vessels.

c. Prior to the start of work on these activities, the Work Crew Supervisor will establish safe zones that maintain at least the minimum 50 ft (15.2 m) required distance between Red Flag vessels and sources of ignition such as hot work and smoking areas.

- minimum distance shall be calculated vertically and horizontally throughout a lock chamber when the chamber is pumped out for maintenance.
- These zones shall be marked, barricaded, or otherwise designated so personnel can easily distinguish them. The location of and restricted activities within these zones shall be included in the activity AHA and discussed with workers prior to start of work.

Section 20 Pressurized Equipment and Systems

- 20.A.08 No safety appliance or device shall be removed or made ineffective, except for making immediate repairs or adjustments, and then only after the pressure has been relieved and the power shut off using proper lockout/tagout procedures.

Section 20

- 20.A.16 Except where automatic shutoff values are used, safety lashings or suitable double action locking devices shall be used at connections to machines of high pressure hose lines and between high pressure hose lines.

Section 20.A

- 20.A.17 If connections of high pressure hoses are secured with a safety lashing:
- a. Safety lashings shall consist of two metal hose clamps connected by a flexible lacing: the metal hose clamps shall be attached to the hose ends separate from the quick makeup connection;
- b. The flexible lacing shall be suitably strong cables, chains, or wires. Wires or pins through the quick makeup connection are not acceptable for use as safety lashings.

Section 20

- 20.B.05 Compressed air for cleaning.
- a. The use of compressed air for blowing dirt from hands, face, or clothing is prohibited.
- b. Compressed air shall not be used for other cleaning purposes except where reduced to less than 30 psi (206.8 kPa) and then only with effective chip guarding and PPE (face shield and safety glasses). This 30 psi (206.8 kPa) requirement does not apply for concrete forms, mill scale, and similar cleaning purposes.

Section 20

- 20.C.03 When any boiler is being placed in service or restored to service after repairs to control circuits or safety devices, an operator shall be in constant attendance until controls have functioned through several cycles or for a period of 24 hours whichever is greater. A report of the operating test shall be provided to the GDA and include the following specific information: time, date, and duration of test; water pressure at boiler; boiler make, type, and serial number; design pressure and rated capacity; gas pressure at burner; flue gas temperature at boiler outlet; and the surface temperature of the boiler jacket. All indicating instruments shall be read at half-hour intervals. .

Section 20

- 20.C.04 Fusible plugs shall be provided on all boilers, other than those of the water tube type.
- a. Replacement of fusible plugs shall coincide with the inspections recommended by the ASME *Boiler and Pressure Vessel Code.*

Section 20

- 20.D.15 If the movement can be accomplished safely, leaking cylinders shall be moved to an isolated location out of doors, the valve shall be cracked and the gas shall be allowed to escape slowly.
- a. Personnel and all sources of ignition shall be kept at least 100 feet away.
- b. Instrumentation should be used to assure protection of personnel from health and flammability hazards.
- c. The cylinder shall be tagged "**DEFECTIVE,**" after the gas has escaped.

Section 20

- 20.D.17 Bleeding of cylinders containing toxic gases shall be accomplished only in accordance with environmental regulations, and in accordance with a government accepted APP and AHA specifically addressing the bleeding of compressed gas cylinders, and only under the direct supervision of qualified personnel

Changes
Chapter 22
Work Platforms and Scaffolding

6/6/2012

22.A.02.a

References 21.A Fall Protection -

6 foot rule for fall protection

Corrected omission of 1 word

22.A.02.b

References Section 21:

Fall protection Systems
&
Personal fall protection systems

22.A.03

Added: For specific guidance related to erecting and disassembling scaffolds, see paragraph 21.J.02

21.J.02 is a new requirement that permits the use of OSHA's possible exemption for fall protection

"For workers erecting and dismantling scaffolds, an evaluation shall be conducted by a Competent Person for fall protection to determine the feasibility and safety of providing fall protection if fall protection is not feasible. An AHA detailing rationale shall be submitted and accepted by the GDA."

New requirement

22.A.06

- Contractors shall have all scaffolds tagged by the competent person for scaffolding
  - Tags shall be color coded; green - safe, red - unsafe.
  - Tags shall be readily visible, legible, & able to withstand the environment
  - Tags shall include:
    a. Name & signature of competent person
    b. dates of initial and last inspection.

22.A.09

Anyone erecting, disassembling, moving, operating, using, repairing, maintaining or inspecting a scaffold shall be trained by a competent person

Proof of training shall be available upon request.

New requirement

22.B.01.b Rephrased for clarity

Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

22.B.08.c

For outrigger scaffolds, the platform will be nailed or bolted to the outriggers and shall extend to within 3 inches (7.6 cm) of the building wall.

Reworded for clarity

22.B.08.f

"Planks shall be maintained in good condition. When cracks exceed 1.5 times the width of the board the plank will not be used. Planks with notches deeper than 1/3 the width of the plank will not be used. Planks with saw kerfs shall not be used.

New requirement added to provide practical means of determining what is considered “good condition”.

22.B.1.d

Where end frames are designed to be used as a ladder or where bolted-on ladders are used, the maximum height will be limited to 20 feet unless fall protection is used. The distance between rungs shall not exceed 12 inches and shall be uniform throughout the length of the ladder. The minimum clear length of the rungs shall be 16 inches.

New requirement to address climbing of end frames, OSHA allows climbing up to 34 feet w/out fall protection

22.B.15

Other types of scaffolding not included in ANSI A10.8 may be approved by the GDA provided the design is approved by a professional engineer or they meet a nationally recognized design standard.

New requirement to allow scaffolds other than those specified in ANSI A10.8

22.C.06.b

Manually propelled mobile scaffolds.

b. All Casters or wheels shall be locked when a scaffold is occupied.

Tightens existing requirement

Section 22.D - Wood Pole Scaffolds

- Errors in tables were corrected and are now consistent with OSHA
- Metric conversions were added where some where missing
- Numbering of tables was changed (requirements moving from section 21 to section 22)

Section 22.E Suspended Scaffolds

- 22.E.01 Suspended scaffolds are scaffolds/work platforms that are suspended from anchorage points/hoists that allow the scaffold to move up and down as needed for work to be performed. Suspended scaffolds shall be designed, constructed, operated, inspected, tested, and maintained as specified in the operating manual for the device.

Section 22.E.15

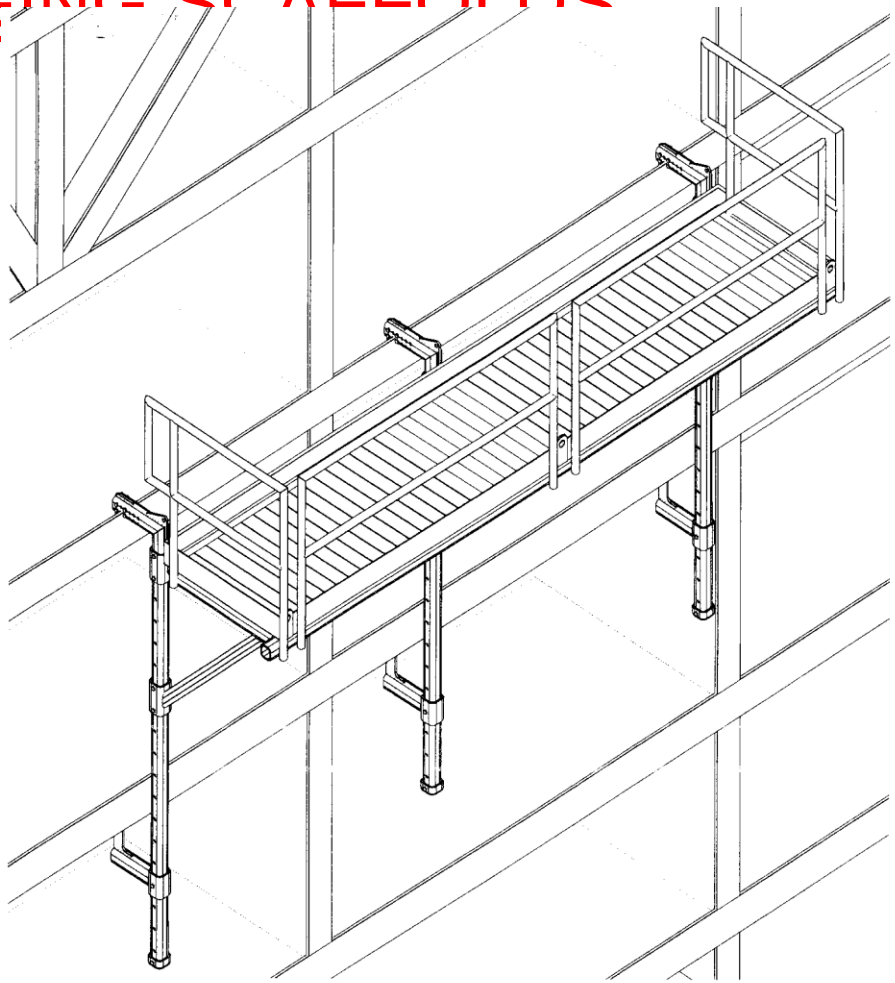
- 22.E.15 Fall protection.
- a. Each person supported by a single-point or two-point adjustable suspended scaffold shall be protected from falling by the use of a fall arrest system. A risk assessment shall be performed when persons are supported on a multi-point adjustable suspended scaffold to evaluate the effectiveness and feasibility of the use of personal fall protection systems. Results shall be documented in the AHA for the activity being performed. **> *See 21.H.05.***

Old 22.F Crane-supported Work Platforms

Moved to section 16

22.F HANGING SCAFFOLDS

Complete new section based on the recommendations of Board of Investigation where civilian fatality occurred



Section 22.F Hanging Scaffolds

- 22.F.01 A hanging scaffold is a scaffold/work platform that is hung from a location (such as a lock gate) for work to be performed and that remains stationary until it is them repositioned with a crane/hoisting device. Hanging scaffolds shall be designed by a Registered Professional Engineer (RPE) competent in structural design. Scaffold performance and components shall meet or exceed those for general scaffolds and platforms found in ANSI A10.8-2001. ***> See Figure 22-1.***

Section 22.F Hanging Scaffolds

- Includes requirements for placement, movement, PPE, fall protection, inspection, testing, and more.

22.G, H and I

- Form and Carpenter's Bracket Scaffolds
- Horse Scaffolds
- Pump Jack Scaffolds

- No Changes Made; just renumbered subsections

22.J - Adjustable Scaffolds

New section that addresses some hazards specific to this type of scaffolding

22.J Adjustable Scaffolds

- Design per ANSI
- Users manual, leveling,
- Access
- Attached to structure

22.K CRANE SUPPORTED WORK (PERSONNEL) PLATFORMS

- See Section 16.T

Was 22.J
Elevating Work Platforms

Renumbered: Now 22.L

22.L.02.c. Height to base width ratio of the scaffold during movement is 2:1 or less, or per manufacturer's instructions.

New requirement

22.M **VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS** (Aerial Devices/Lifts).

Vehicle-mounted elevating and rotating work platforms (aerial lifts, to include articulating boom platforms/lifts (knuckle boom lifts), trailer-mounted boom lifts) shall be designed and constructed per ANSI/SIA A92.2.

Clarified the scope

22.M.01.e

All required safety decals, labels and signs shall be in place and readable. If the rating plate, signs, labels are not present or are not readable, equipment shall not be used.

New requirement

22.M.05

Operating practices.

a. Brakes shall be set and outriggers, when used, shall be on pads or a solid surface.

b. Wheel chocks required on an incline.

c. Lift controls shall be tested each day prior to use.

e. Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls.

(1) Upper controls shall be in or beside the platform within easy reach of the operator.

(2) Lower controls shall provide for overriding the upper controls.

(3) Controls shall be plainly marked as to their function.

(4) Lower level controls shall not be operated unless permission has been obtained from the employee in the lift except in case of emergency.

f. Climbers shall not be worn while performing work from an aerial lift.

g. The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

22.L is now 22.N
Mast climbing Work Platforms

22.N.01

Mast Climbing work platforms shall be erected, used, inspected, tested, maintained, and repaired in accordance with ANSI A 92.9 and the manufacturer's recommendations as outlined in the operating manual.

Added reference to ANSI standard

22.N.11

Climbing of braces and guardrails is prohibited. When access ladders, including masts designed as ladders, exceed 20 ft in height positive fall protection shall be used.

Masts can get well above the typical 20 foot limit of a “fixed ladder”; above which fall protection is needed

22.O - Roofing Brackets

•Formerly 27.H.15 a & b

now 22.O.01-22.O.03

•22.O.01 Added: Nails will be driven into a rafter or beam; not just into the decking. Fasteners will be selected in accordance with the manufacturer's recommendations.

22.O.02 no change

•New requirement: 22.O.03 Positive fall protection will be used when working at heights over six feet.

New requirements

22.P - Stilts

- 22.P.01 Stilts shall not be used on scaffolds.
- 22.P.02 Surfaces on which stilts are used shall be flat and free of pits, holes, obstructions, debris and other tripping or slipping hazards.

New requirements

6/6/2012

22.P - Stilts

- 22.P.03 Stilts shall be properly maintained. Any alteration of the equipment shall be approved by the manufacturer.

- 22.P.04 Stilts shall not be used on stairs. When used adjacent to stairs or ramps where a fall to a different level could occur, guardrails or other fall protection shall be provided (increased in height by an amount equal to the height of the stilts).

New requirements

22.P - Stilts

•22.P.05 Employees shall be trained in the proper use of stilts.

•22.P.06 When using stilts exposes workers to a fall of 6 ft (1.8 m) or more in areas protected by guardrails, the height of the guardrail must be raised accordingly to maintain a protective height of 42 in (107cm) above the stilt. See 21.E.06.

New requirements

Section 23 Demolition

- 23.A.01 Demolition activities shall be performed in accordance with ANSI Standard A10.6, Safety Requirements for Demolition.

- Several Minor word changes

SECTION 25

- Requires Written Excavation/ Trenching Plan
- Identifies Competencies for Competent Person for Excavation & Trenching
- Rescue Equipment & Procedures (Confined Space)
- Defines Soil Classifications, determination by CP

Section 26 Underground Construction (Tunnels), Shafts and Caissons

No significant changes.

Updated resources and references

Section 27 CONCRETE, MASONRY, STEEL ERECTION AND RESIDENTIAL CONSTRUCTION

- Added Residential construction due to MilCon Transformation Program
- Segregated SubSections for clarity
- Removed steel and residential fall protection measures from section – all fall protection except marine systems is in Section 21.

27.A General

- **The fall protection threshold height requirement is 6 ft (1.8 m) for ALL WORK covered by this manual, unless specified differently below, whether performed by Government or Contractor work forces,** to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work. ***> See Section 21***.

27.A.03 Working under loads

- a. No employee shall be permitted to work under concrete buckets, bundled material loads, or other suspended loads (riggers securing lower loads to multi-lift rigging and workers engaged in the initial connection or placement of suspended structural components such as beams, trusses, and precast members are excluded from this requirement. In these cases, work controls should be used to minimize the time spent directly under loads).

6/6/2012

27.A.03 Working under loads

- b. Elevated concrete buckets and loads shall be routed, to the extent practical, to minimize the exposure of workers to hazards associated with falling loads or materials from the loads. Vibrator crews shall be kept out from under concrete buckets suspended from cranes of cableways.
- c. Riding on concrete buckets or other suspended loads shall be prohibited.

27.D PreCast Concrete Operations

- 27.D.01 Precast Concrete operations shall be planned and designed by a Registered Professional Engineer (RPE). Such plans and designs shall include detailed instructions and sketches indicating the prescribed method of erection and shall be submitted to the GDA for review.

- In line with OSHA requirements

27.F STRUCTURAL STEEL ASSEMBLY

- 27.F.01. Prior to beginning the erection of any structural steel, a Steel Erection Plan shall be submitted to the GDA for review and acceptance. The plan will include the identification of the site and project; and will be signed and dated by the Qualified Person(s) responsible for its preparation and modification. This plan shall include the following information, as applicable to the particular project:

Section 27.F

- 27.F.09 A Qualified Rigger shall inspect the rigging prior to each shift.
- 27.F.12 Safety latches on hooks shall not be deactivated or made inoperable. **EXCEPTION:** When a Qualified Rigger has determined that the hoisting and placing of purlins and single joists can be performed more safely by doing so and precautions related to this practice are included in the accepted steel erection plan.

Section 27.F

- 27.F.15 Installation of metal decking.
- a. Metal decking shall be laid tightly and secured upon placement to prevent accidental movement or displacement. A maximum of 3,000 ft2 may be laid before securing.

04/23/2008

27.J RESIDENTIAL CONSTRUCTION

- 27.J.01 All wood used for residential construction shall meet applicable building codes and design criteria. Wood used for temporary work platforms and/or fall protection must be inspected for compliance with Sections 21 and 22, as structural lumber from the site may not meet the requirements for protective systems.

27.J Residential Construction

- 27.J.02 Hand and power tools shall be equipped and used in accordance with the requirements of Section 13.

27.J Residential Construction

- 27.J.03 Raising Walls.
- a. Before manually raising framed walls that are 10 ft or more in height, temporary restraints such as cleats on the foundation/floor system or straps on the wall bottom plate shall be installed to prevent inadvertent horizontal sliding or uplift of the framed wall bottom plate
- b. Anchor bolts alone shall not be used for blocking or bracing when raising framed walls 10 ft or more in height.

27.J Residential Construction

- 27.J.04 Employees shall not work from or walk on top plates, joists, rafters, trusses, beams or other structural members until they are securely braced and supported.

27.J Residential Construction

- 27.J.05 Truss Support Plate. Where a truss support plate is used during the installation of trusses, it shall be constructed of a 2 in x 6 in plank laid flat, secured linearly to a 2-in x 6-in plank laid on edge, supported with 2-in x 4-in wood members (legs) spaced no more than 6 ft on center and attached to diagonal bracing adequately secured to support its intended load. All material dimensions are minimum and nominal.

27.J Residential Construction

- 27.J.06 Trusses installed without a ridge beam or other horizontal structural connection shall be connected temporarily to each other and to a secured end gable by a minimum of one 1x4 plank face-nailed to every rafter on each slope of the truss. The number of planks shall be sufficient to protect against wind-related collapse of the truss rows.

27.J Residential Construction

- 27.J.07 During construction, proper work platforms such as scaffolds and decks, in accordance with Section 22 shall be used. Walking on plates, beams, joists, and other members more than 6 ft (1.8m) above the ground or floor is prohibited unless workers meet the fall protection practices outlined in Section 21.O.

SECTION 28

28.C.01 Safety and Health Manager (SHM) is required at cleanup operations. The SHM, dependent upon the contaminant-related hazards on the project, shall be a Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) or Certified Health Physicist (CHP).

Includes responsibilities

Section 28

- 28.D. Training
- Added requirements for continuing education for 40-Hour HTRW Health and Safety trainers - 5 days of training over a 5 year period is required.

- Allows for 40-Hour HTRW computer-based training as long as:
  - Required topics are covered
  - Employees can interact with the teacher
  - 16-hours of hands on exercises to demonstrate equipment use and procedural proficiency.

SECTION 28

- Allows 8-Hr HTRW Refresher computer-based training as long as:
  - Required topics are covered
  - Employees can interact with the teacher
  - Students must have access to hands-on exercises when necessary for thorough learning

Section 29 Blasting

-Minor changes

- -Higher HQs Plan Approval - 29.A.01.c If work is performed with military explosives, the blasting plan is required to be submitted (throughout the chain of command, ref. EM 385-1-97, Chapter IV.C) to DDESB upon request. (DoD 6055.09-STD, paragraph C1.3.1 and EM 385-1-97).
- 29.I.05.b b. When a misfire is declared, the blaster shall wait 1-hour before inspecting the site and provide proper safeguards for excluding all employees, except those necessary to do the work, from the danger zone.

SECTION 30
DIVING OPERATIONS

- Deleted “Contract” from Title
- EM 385-1-1 2008 includes changes that were decided upon and printed in interim change #0015, Mar 2008
- No major changes made since then
- Contains tech safety requirements for both government and contractor divers

30. A GENERAL

- Dive Training
  - in compliance with the OSHA Diving Standards 29 CFR 1910.410, Can be provided by:
  - commercial diving school
  - in-house training program meeting ANSI/ACDE-01, or (ADCI) Consensus Standards.
  - Scientific Divers can meet above the American Academy of Underwater Scientists Standards.
- Pre-Dive Conference
  - held Prior to initial work on each dive,
  - Include key personnel and the USACE and a Contractor Rep. with sufficient authority to implement any changes required.
- New Dive plan elements:
  - ID of topside assistance/support to the dive team (i.e., crane operator, lock operator, etc.);
  - Means of direct communication between the dive site and external personnel.

30.B DIVING OPERATIONS

- Staging areas
  - selected and configured by looking at diver access, hazards to diver, standby diver access to water ability to protect topside members and equipment.
- Standby diver
  - Provided whenever a diver(s) is in the water
  - One standby at the surface for each pair of Untethered SCUBA divers
  - Will deploy only after dive supervisor instructs him to do so.
  - Must be fully equipped to dive and readily available.
  - Shall don and test all specific gear before primary diver leaves surface.
  - Gear maintained operational and ready for immediate use.
  - Standby dressed appropriately for the climate
  - Will remain fully suited up from the time primary diver leaves the surface until reaching working depth.
  - At that point, standby may remove the portions of his or her gear to prevent heat/ cold stress and fatigue.

30.B DIVING OPERATIONS

- Decompression chamber operators:
  - Planned surface decompression requires sole duty chamber operator.
  - If decompression for emergencies only:
    - a team member with other team duties may serve as the chamber operator (allows one less person on dive team)
    - all diving shall be suspended during the chamber operations.
- Dive operations
  - fully coordinated with external operations
  - When needed, dive supervisor will develop a Hazardous Energy Control Plan (see Section 12).
  - When diving under an existing Plan, dive supervisor will establish control procedures with facility leader.
  - Dive supervisor shall coordinate with controlling authorities to minimize the hazards from water traffic, industrial operations, etc.

30.B DIVING OPERATIONS

- Pressure differentials
  - The dive supervisor will develop specific plans and procedures to prevent diver exposure to pressure differentials, including:
    - ID of all potential exposure points (gate sills, valve openings, holes, etc.)
    - Means for identifying whether controls are fully in place
    - Methods for checking pressure differential openings
    - Routing diver and umbilical away from uncontrolled pressure differential openings.
    - Procedures for immediate emergency pressure equalization or reduction, if possible, and
    - Procedures for emergency diver rescue
- SCUBA diving operations **shall not** be conducted:

  (In addition to previous restrictions) :
  - In areas where pressure differentials exist and it cannot be positively verified that all potential leaks have been eliminated.
  - When the diver does not have direct access to the surface.

30.F EQUIPMENT REQUIREMENTS

- Air compressors:
  - Intakes located away from/ upwind of exhaust, etc.
  - Equipped with in-line absorbent beds/ filters if used in areas with known or suspected air contamination.
  - Oil -lubricated compressors containing a petroleum or potential CO-producing lubricant for the air pressurization pistons will not be used.
  - Direct Source compressors shall have a low air pressure alarm in the system.

Manning levels

- SURFACE SUPPLIED AIR - 0 to 100 ft. Min. manning 4, penetration dives req. 6
- SURFACE SUPPLIED AIR - 101 to 190 ft. req. 5 or 6 depending on decompression – 8 for penetration dives.
- MIXED GAS same as 101 to 190 SSA

Section 31 Tree Maintenance & Removal

- **31.A.01 References - NEW**

a. ANSI Z133.1-2006 – Tree Care Safety Standard;

b. 29 CFR 1910.266 – Logging Operations;

c. 29 CFR 1910.269 – Electrical Power Generation, Transmission, and Distribution;

d. International Society of Arborist Safety Standards.

- 31.A.08 Aerial Platforms and Buckets – **NEW - fall protection requirements/clarifications**

Section 31 Tree Maintenance & Removal

31.B.01 - 14 Tree Climbing Techniques – **NEW** .

a. All tree work operations above a height of 12 ft (3.6 m), whether there are electrical hazards or not, shall require a second worker in the area. If climbing is being performed, the 2nd worker shall also be a qualified climber, capable and knowledgeable of rescue techniques, including self rescue.

b. Use of Rope Access techniques should only be used where other means of access or undertaking the work such as mechanically operated work platforms or pole saws are not practical. > ***See Appendix P for recommended rope climbing*** equipment, techniques, and safety practices.

31.B.14 Climbers over the age of 40 years shall have obtained a medical clearance for heavy exertion work within the past 2 years.

Section 31 Tree Maintenance & Removal

31.C Felling – **NEW**

31.E.01.d.- g. Pruning and Trimming - **NEW** requirements

31.E.04 Cabling – **NEW**

31.E.05 Topping/Lowering Limbs – **NEW**

31.E.07.g. – k. Power Saws – **NEW**

Appendix P - Safe Practices for Rope Access Work

COMPLETELY NEW

References

a. Society of Professional Rope Access Technicians – Safe Practices for Rope Access Work.

b. Determination of Rope Access and Work Positioning Techniques in Arboriculture

Definitions

a. Rope Access Supervisor

b. Rope Access Worker

Appendix P

Climbing Equipment

a. Ropes

b. Carabineers & Snap Hooks

c. Pulleys/Rope Sleeves

d. Rope Blocks/Brakes

e. Climbers PPE

General Practices

SECTION 32 AIRFIELD and AIRCRAFT OPERATIONS

32.A.02 Prior to the performance of any work upon or around an airfield, the Air Field Manager shall be informed 14 days prior to performance with a written description of work activities, etc.

a. The GDA shall also be informed of proposed revisions to approved work activities in writing, or any changes to this information.

32.A.04 All paved surfaces, such as runways, taxiways, and hardstands, shall be kept clean at all times…Sweeping operations shall be performed by truck mounted vacuum sweeper capable of using water to minimize dust generation.

SECTION 32 AIRFIELD and AIRCRAFT OPERATIONS

•32.A.05 When mobile equipment is not actively being utilized to perform work on an airfield it, shall be removed…

•32.A.08 All vehicle access shall be at an entry control point (ECP) and approved by the Airfield Manager. Effective control of vehicles required to enter or cross aircraft movement areas shall be maintained as directed by the Airfield Manager.

•32.A.09 Those landing areas hazardous to aircraft shall be submitted to the Air Field manager for a FAA Notum on displaced threshold or other changes on non use or caution. (unless otherwise directed by the GDA).

SECTION 32 AIRFIELD and AIRCRAFT OPERATIONS

•32.A.11 When working in landing areas, work shall be performed so as…Each vehicle, piece of equipment, or work crew shall be equipped with a 2 way radio capable of maintaining communications with the air traffic control tower while performing work in landing areas.

32.A.12 No equipment, materials or contractor plant shall be placed upon or within a safety precaution area without approval of the GDA.

SECTION 32 AIRFIELD and AIRCRAFT OPERATIONS

- Section “18E Aircraft” (old) now Section “32.B Aircraft” (combines with Airfield operations

- 32.B.06 All USACE-owned aircraft will use approved Government Flight Representatives (GFRs) approved procedures as outlined in AR 95-20 and AR 95-1. GFR are appointed by USACE-SO for USACE owned aircraft.

Section 33, MEC Encountered During USACE Activities

33.A. Background and Process; what to do if you encounter MEC while working

- -Stop work and Report
- -3Rs: Recognize, Retreat, Report
- -Potential Munitions Response Site (MRS)
- -Assess additional MEC Probability
- -Follow up requirements on EM and EPs

33.B. MEC Examples (photos)

NEW Section 34 - Confined Space

- Section 06.I (old) is now Section 34
- Added section 34.A - Marine Repair Confined Space
- Reflects OSHA Std on Definitions and Requirements
- Better defined Non-Permit Confined Space for clarity