Precast Specific Safety Rules

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and

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Columbus Area Office
Overview

• OSHA inspections in the precast industry
• Safety and health hazards with precast manufacturing – General Industry
• Precast Concrete handling fatalities
• Safety and health hazards with precast panel handling – Construction
• Compliance assistance resources
OSHA’s Mission

Assure so far as possible safe and healthful working conditions for every working man and woman in the nation by setting and enforcing standards and by providing training, outreach, education and assistance.
OHIO WORKPLACE FATALITIES ON THE RISE

In Ohio about one person each week dies in a workplace accident

* Too many preventable injuries, illnesses and fatalities continue to occur in Ohio
* Workers and families should never accept the risk of death as a condition for employment

Commit to a Safe and Healthy Workplace in 2015

Workplace Safety Happens on Purpose – Not By Accident

Employers must plan for a safe and healthy workplace by developing a good safety and health program that includes: management leadership, worker participation, hazard identification, hazard prevention and control, education and training, and program evaluation and improvement. The basic idea behind these programs is to change the workplace culture by developing a process to identify and fix hazards.

OSHA®
National Emphasis Programs

- Amputations
- Combustible Dust
- Fed Agencies
- Food Flavorings
- Hex Chrome
- Lead
- Primary Metals
- PSM (Chem Plants)
- Nursing Homes & Residential Care Facilities
- Silica
- Ship Breaking
- Trenching
- Isocyanates
Region V Local Emphasis Programs (LEPs) - FY 15

• **Fall Hazards** (Construction & General Industry)
  • Primary Metals
  • Grain Handling Facilities
  • Tree Trimming Operations
  • Powered Industrial Vehicles (Construction & GI)
  • Building Renovation/Rehab - “Gut Rehab”
General Duty Clause

• Section 5(a)(1) of the Occupational Safety and Health Act of 1970:

The employer did not furnish employment and a place of employment which were free from recognized hazards that were causing or likely to cause death or serious physical harm to employees.
Trenching/Excavation, 1926.652

- Cave-in protection
- Access in/out of trench
Walking/Working Surfaces
Guarding Floor and Wall Opening

1910.23(a)(1)
• Every stairway floor opening shall be guarded by a standard railing

1910.23(c)(1)
• Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by standard railing.
Open floor holes
1926.602(c)(1)(ii) No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.
Finger rack with inadequate rebar pin holding panels.
Subpart H - Materials Handling, Storage, Use & Disposal
(1926.250 - 252)

Rigging equipment inspection & removal from service
- 251(a)(1) Exterior drop chutes 35
- 252(a) Welded alloy steel chain slings - Identification 29
- 251(b)(1) Slings, fastenings & attachments - Inspections 26
- 251(a)(6) Synthetic web slings - Removal from service 23
- 251(e)(8) 17

OSHA®
1926.251(a) (1) Rigging Equipment for Material Handling

• Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.
1926.251(a)(5)
Types of Rigging equipment for material handling

- Synthetic Fiber
- Metal Mesh
- Alloy Steel
- Wire Rope
Subpart-H, Effective July 8, 2011

• All rigging including wire rope slings shall have permanently affixed, legible identification markings stating size rated capacity for the types of hitches used with angles.

• Shackles must have legible markings (working load limits) prescribed by the manufacturer.
Sling Identification Requirements

- Alloy Steel (tag required)
- Synthetic (tag required)
Broken wire
Bird Caging
KINKING
LUBRICATION
Ropes and chains shall be regularly lubricated
1926.251(b)(3)

- Alloy Steel Chain
  - No job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, or other such attachments, can be used.
1926.251(b)(5)

Whenever wear at any point of any chain link exceeds that shown in Table H-2, the assembly shall be removed from service.
Avoid:
- Side load
- Back load
- Tip load

Max twist
10°
29 CFR 1926  Subpart Q
Concrete and Masonry Construction
Scope - Application

➢ Contains requirements to protect all construction employees from the hazards associated with concrete and masonry construction operations performed in workplaces covered under 29 CFR 1926.
Concrete and Masonry Construction

- **1926.700** - Scope, application, and definitions applicable to this subpart.
- **1926.701** - General requirements
- **1926.702** - Requirements for equipment and tools.
- **1926.703** - Requirements for cast-in-place Concrete.
- **1926.703 App** - General Requirements for Formwork
- **1926.704** - Requirements for precast concrete.
- **1926.705** - Requirements for lift-slab operations.
- **1926.705 App** - Lift Slab Operations
- **1926.706** - Requirements for masonry construction.
Wells, pits, shafts, or similar excavations 6 ft. or more in depth must have guardrails, fences, barricades, or covers.

1926.501(b)(7)(ii)
Precast Concrete Erection
Safety Monitor and Controlled Access Zone

1926.502(h)(4)
• Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors

1926.502(g)(1)(ii)
• When erecting precast concrete members, the control line shall be erected not less than 6 feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge
**Pre-Cast Concrete Wall Units**

- Lifting inserts for tilt-up precast concrete members = $2 \times \text{max intended load}$
Pre-Cast Concrete Wall Units

- Wall panels must be adequately supported to prevent overturning or collapse

29 CFR 1926.704(a)
Pre-Cast Concrete Wall Units

- Lifting inserts for precast concrete members = 4x max intended load
Lifting Hardware

- Capable of supporting 5x max intended load applied or transmitted to lifting hardware

29 CFR 1926.704(d)
Employees

- Not permitted under precast members being lifted or tilted into position
Limited Access Zone (LAZ’s)

LAZ’s **shall** be established whenever a masonry wall is being constructed.

- Established prior to start of construction
- Equal to height of the wall **plus 4’**
- Un-scaffolded side of wall
- Remain until adequately supported
- Masonry walls over **8’** adequately braced

29 CFR 1926.706(a)
OPERATOR QUALIFICATION / CERTIFICATION

- **OPTION 1:** Accredited testing organization
- **OPTION 2:** Audited employer program
- **OPTION 3:** U.S. military
- **OPTION 4:** State/local license

**Testing Criteria**

- **Knowledge** (written test):
  - Controls/performance characteristics
  - Calculate capacity
  - Preventing power line contact
  - Ground conditions & equipment support
  - Use and locate info in operating manual
  - Appendix C subjects

- **Practical test**
### OPERATOR QUALIFICATION / CERTIFICATION

<table>
<thead>
<tr>
<th>Accredited testing organization</th>
<th>Portable</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES *</td>
<td>5 years</td>
</tr>
</tbody>
</table>

| Audited Employer Program        | NO       | 5 years        |

<table>
<thead>
<tr>
<th>U.S. Military license</th>
<th>NO *</th>
<th>Set by issuing entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>State/local license</td>
<td>NO *</td>
<td>Set by issuing entity, not &gt; 5 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid only in jurisdiction</td>
</tr>
</tbody>
</table>

* Subject to State & Local requirements and whether or not the military/state training meets accredited requirements.
Electrocution Hazards

• Know where power lines are located
  – pre-planning phase of construction
• If using a crane have a set-up meeting prior to crane use
Fatality with dump truck bed hitting overhead power lines

Employee realized the electrical line landed on the cab and attempted to exit the truck.
Crane Power Line Safety

• Step 1-Job Assessment
  – Always know the voltage of the line.
    • Get the voltage from the power company. Use the tag number on the telephone pole or an address.
    • Determine if the crane boom or load can get within 20 feet of an energized power line.

Note: Even if the employer has no intention of working up to the crane’s maximum radius in the work zone, the assessment must still be made using this assumption.
Crane Power Line Safety

75 Ton Linkbelt with 96’ boom

No Action Required

Power Line

20 Feet

96'
Crane Power Line Safety

Power Line

20 Feet

Proceed to Step 2

75 Ton Linkbelt with 96’ boom
Crane Power Line Safety

• Step 2 - Job Assessment
  – Ensure that any part of the equipment or the load will not come within the minimum approach distance as permitted.

<table>
<thead>
<tr>
<th>Normal Voltage, kV (Phase to Phase)</th>
<th>Minimum Required Clearance, ft (m) [Note (1)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation Near High-Voltage Power Lines</td>
<td></td>
</tr>
<tr>
<td>Up to 50</td>
<td>10 (3.05)</td>
</tr>
<tr>
<td>Over 50 to 200</td>
<td>15 (4.60)</td>
</tr>
<tr>
<td>Over 200 to 350</td>
<td>20 (6.10)</td>
</tr>
<tr>
<td>Over 350 to 500</td>
<td>25 (7.62)</td>
</tr>
<tr>
<td>Over 500 to 750</td>
<td>35 (10.67)</td>
</tr>
<tr>
<td>Over 750 to 1,000</td>
<td>45 (13.72)</td>
</tr>
</tbody>
</table>
Crane Power Line Safety

• Step 3 - Preventing
  – Conduct a planning meeting with the operators and other workers.
  – Use non-conductive tag lines.
  – Assign a designated spotter who is also a qualified signal person.
  – Erect and maintain an elevated warning line, barricade or line of signs in view of the operator.
Crane Power Line Safety

• Step 4-Preventing
  – If working within the minimum approach distance be aware of additional requirements as listed in 29CFR 1926.1410.
    • Power line representative or professional engineer will set the minimum distance.
    • Circuit re-energizers must be disabled.
    • Use of an insulating link.
    • Use of non-conductive rigging.
    • Barricades 10 feet around the crane to prevent contact.
    • Ground the crane.
    • Power line representative or professional engineer must identify one person on site to direct the additional procedures.
    • Additional training for the entire crew working on the job.
• Signal Types:
  – Hand, voice, audible or “new”
  – Only time an operator can use a cell phone while lifting (but must be hands free)

• Signal person – *when required*:
  – Point of operation not in full view of operator
  – View of direction of travel is obstructed
  – Site-specific safety concerns
SIGNAL PERSON

• Qualification Requirements:
  – Know & understand signals
  – Competent in using signals
  – Basic understanding of crane operation
  – Verbal or written test plus practical test
## SIGNAL PERSON

### Qualifications

<table>
<thead>
<tr>
<th>Qualified how</th>
<th>Documentation</th>
<th>Portable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third party qualified evaluator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Employer qualified evaluator</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Qualified Rigger

• Qualified Person
  – *Qualified person* means a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.

*Qualified rigger* is a rigger who meets the criteria for a qualified person.
Qualified Rigger

• When is one required?
  – When employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:
    – The materials being hoisted must be rigged to prevent unintentional displacement.
    – Hooks with self-closing latches or their equivalent must be used. *Exception:* "J" hooks are permitted to be used for setting wooden trusses.
    – The materials must be rigged by a qualified rigger.
CRANES & DERRICKS

INSPECTIONS
# INSPECTIONS

<table>
<thead>
<tr>
<th>Type of Inspection:</th>
<th>Who Inspects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified or repaired/adjusted</td>
<td>Qualified person</td>
</tr>
<tr>
<td>Post-assembly</td>
<td>Qualified person</td>
</tr>
<tr>
<td>Shift</td>
<td>Competent person</td>
</tr>
<tr>
<td>Monthly</td>
<td>Competent person</td>
</tr>
<tr>
<td>Annual</td>
<td>Qualified person</td>
</tr>
</tbody>
</table>
Inspections

• Annual Inspections
  – Performed at least every 12 months
  – Performed by a qualified person
  – Specific list of items to be checked is listed in the standard.
  – Disassembly is required
  – Includes wire rope
  – Documentation
    • Items checked and the results of the inspection
    • Name, Signature and the date of the inspection
    • Kept on file and available for 12 months.
Inspections

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  – Performed at least every 12 months
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  – Specific list of items to be checked is listed in the standard.
  – Disassembly is required
  – Includes wire rope
  – Documentation
    • Items checked and the results of the inspection
    • Name, Signature and the date of the inspection
    • Kept on file and available for 12 months.
Inspections

• Daily, “Each Shift”
  – Performed by a qualified person.
  – Equipment cannot be used unless there are no deficiencies that constitute a “Safety Hazard”.
  – Documentation
    • None required
  – Items to be inspected:
    • Control Mechanisms
    • Air, Hyd and other pressurized lines.
    • Hydraulic system, Level, leaks etc.
    • Hooks and latches.
    • Wire rope reeving.
    • Wire rope condition.
    • Electrical apparatus.
    • Tires
    • Ground Conditions, proper support.
    • Equipment is level.
    • Operators cab windows.
    • Rails, rail stops or clamps.
    • Safety devices and operational aids for proper operation.
    • Any deficiency that may constitute a “Safety Hazard”.
When any necessary repairs or adjustments are needed for the equipment and alternative methods are being implemented, the employer must communicate this information to all affected employees at the beginning of each shift. (§ 1926.1417(j))
Required Documentation Includes

- Monthly & annual inspection reports for the equipment and wire rope
- Modifications that affect the safe use of the equipment
- Operator and signal person qualifications
- Tower crane foundation/support design
- When repairs or adjustments of the equipment are needed
Required Documentation

Includes

• Employer-developed procedures (i.e., assembly/disassembly, operational, and other procedures related to the safe operation of the equipment)

• Power line encroachment procedures/plan
Respiratory Protection

1910.134

- Written respiratory protection program
  - Selection
  - Medical evaluation
  - Fit-testing
  - Training

NOTE: Assess air contaminants levels first.
"Exposure to silica can be deadly, and limiting that exposure is essential. Every year, many exposed workers not only lose their ability to work, but also to breathe. This proposal is expected to prevent thousands of deaths from silicosis – an incurable and progressive disease – as well as lung cancer, other respiratory diseases, and kidney disease. Workers affected by silica are fathers, mothers, sisters and brothers lost to entirely preventable illnesses. We're looking forward to public comment on the proposal."

— Dr. David Michaels Assistant Secretary of Labor for Occupational Safety and Health

http://www.osha.gov/silica
Crystalline Silica

• SiO₂—silicon dioxide
• Also known as “free silica”
• Significantly more hazardous than amorphous silica
• 3 mineralogical forms
  – Quartz—most common
  – Cristobalite
  – Tridymite
What’s wrong in this picture?
Ways to Reduce Exposure

• Substitute materials that have no crystalline silica
• Locate employees as far as possible from dust-generation source
• Isolate employees OR the source
  – Control rooms
  – Enclosures
  – Barriers
Ways to Reduce Exposure (cont’d)

• Use local exhaust ventilation (LEV systems)
• Use tools with dust-collecting systems
Ways to Reduce Exposure (cont’d)

• Use wet methods
  – Cutting
  – Chipping
  – Drilling
  – Sawing
  – Grinding

• Clean surfaces with HEPA vacuums or wet sweeping—*no compressed air!*
Controls—Wet Methods

Source: Dry Cutting and Grinding is RISKY BUSINESS. NJDHSS.
Ways to Reduce Exposure (cont’d)

• And if other methods are not sufficient—

*Use Proper Respiratory Protection*
Cement

- Ready mixed concrete, is a highly alkaline material (pH 12-14) when wet
- It is hygroscopic, drawing moisture from skin; and it’s abrasive
- Also causes allergic skin responses because it contains hexavalent chromium
Acute Irritant Dermatitis (Cement Burns)

- Burning is accelerated by clothing, boots or gloves soaked in cement.
- Alkali damage causes no heat or pain.
- Skin grafts and scars may be result of the burn.
Allergic Contact Dermatitis

- Swelling, redness, oozing, cracking, stinging, itching, blisters and scaling
- Chrome sensitization is irreversible.
- Must avoid contact with wet and dry cement.
Prevention

- Protect skin by:
  - Work practices to prevent contact with cement
  - Use of personal protective equipment to prevent skin contact
  - Use of neutralizing solutions sprayed directly on the skin
Skin Injuries

- Injury by mechanical means results in friction, pressure or other trauma causing calluses, blisters, nerve damage, bone damage, cuts, abrasions and possible secondary infections.

- Those who use riveters, chippers, drills and hammers are also at greater risk for bone damage, nerve or soft tissue damage.
Eye Injuries

- Most eye injuries are caused from:
  - penetration into the eye which can result in blindness
    - i.e. small fragment of rock or metal passing through the eye at high speed,
    - or masonry nails entering the eye.
  - Shields and guards (e.g. windshields on heavy equipment), prohibiting use of compressed air for cleaning, and safety goggles of high-impact-resistance materials prevent most foreign body related injuries.

Safety glasses are good but particles can still hit the eye from the side so the glasses must have side shields.
Publications include:

- Training guide
- Posters
- Handouts
- Wallet cards

Available in both English and Spanish

STOPPING FOR WATER KEEPS YOU GOING.

WATER. REST. SHADE.

OSHA © Occupational Safety and Health Administration
U.S. Department of Labor

1-800-321-OSHA (6742)
TTY 1-877-889-5627
www.osha.gov

Heat Safety Tool

Or Enter Numbers:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>80°F</td>
<td>80%</td>
</tr>
</tbody>
</table>

Heat Index: **84.2 °F**

Risk Level: **LOWER (CAUTION)**

Precautions
Thank-you

www.osha.gov

Questions?