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APPENDIX A  
EXAMPLES OF MANUFACTURED CONCRETE PRODUCTS  
WITHIN SIC 3272

Appendix A  
Examples of Manufactured Concrete  
Products within SIC 3272

This appendix contains a listing of the various manufactured concrete products concerned within the scope of this document.

Areaways, basement window: concrete  
Art marble: concrete  
Architectural precast concrete panels  
Ashlar: cast stone  
Bathtubs: concrete  
Beams and joists: concrete  
Bridge products: precast concrete  
Building stone, artificial: concrete  
Burial vaults: concrete and precast terrazzo  
Catch basin covers: concrete  
Ceiling squares: concrete  
Chimney caps: concrete  
Church furniture: concrete  
Columns: concrete  
Conduits: concrete  
Copings: concrete  
Cribbing: concrete  
Doorframes: concrete  
Drain tile: concrete  
Fireplaces: concrete  
Floor slabs: precast concrete  
Floor tile: precast concrete  
Fountains, wash: precast terrazzo  
Garbage boxes: concrete  
Grave markers: concrete  
Grease traps: concrete  
Hollow-core prestressed planks  
Housing components, prefabricated: concrete  
Incinerators: concrete  
Irrigation pipe: concrete  
Laundry trays: concrete  
Lintels: concrete  
Manhole covers and frames: concrete  
Mantles: concrete  
Mattresses for river revetment: concrete articulated  
Meter boxes: concrete  
Monuments: concrete  
Panels and sections, prefabricated: concrete  
Paving materials: prefabricated concrete, except blocks  
Pier footings: prefabricated concrete

Piling: prefabricated concrete  
Pipe: concrete  
Poles: concrete  
Posts: concrete  
Septic tanks: concrete  
Shower receptors: concrete  
Siding: precast stone  
Silos: prefabricated concrete  
Slabs, crossing: concrete  
Steps: prefabricated concrete  
Storage tanks: concrete  
Structural precast prestressed concrete products  
Tanks: concrete  
Thresholds: precast terrazzo  
Tombstones: precast terrazzo or concrete  
Wall base: precast terrazzo  
Wall squares: concrete  
Well curbing: concrete  
Window sills: cast stone

APPENDIX B  
REVIEW OF STATE, FEDERAL, AND FOREIGN SAFETY STANDARDS  
AND TRADE ASSOCIATION GUIDELINES



APPENDIX B  
REVIEW OF STATE, FEDERAL, AND FOREIGN SAFETY STANDARDS  
AND TRADE ASSOCIATION GUIDELINES

This appendix contains a review of existing State, Federal, and foreign safety standards as well as trade association guidelines that apply to the precast concrete products industry.

A. State and Foreign Standards

A review of the standards of the States that administer their own occupational safety and health programs shows that no State has vertical standards that specifically address safety in the manufacturing of precast concrete products. Safety matters in the remaining States are regulated by the OSHA General Industry Standards, 29 CFR 1910 [32].

Occupational safety and health standards that address operations in the precast concrete products industry were requested from Germany, the United Kingdom, France, the Netherlands, Belgium, Australia, Canada, and Mexico. The Canadian standards [49, 50] that regulate architectural and structural operations are included for evaluation. Australia, France, and Belgium have standards for the concrete construction industry, but do not regulate manufacturing operations. The remaining countries do not have safety standards that specifically address precast concrete operations.

B. Trade Association Guidelines

The ACPA has published a "Concrete Pipe Handbook" [8] that contains some suggestions on handling, unloading, and site storage. The PCI has developed a "Safety and Loss Prevention Manual" [39] that includes sections on subjects such as training motivation, yard storage, tensioning equipment, stressing operations, steel placement, travelifts, chucks, and harping. These subjects are specifically related to tasks or operations in the architectural and structural sectors of the industry.

C. Foreign Standards vs. Trade Association Guidelines

International standards and guidelines are incorporated, where appropriate, in the comprehensive safety recommendations presented in Chapter IV. A comparison of these standards and guidelines are presented topically, by operation, in the following section.

1. Forming

Canada requires that, in facilities for making forms and accessories, the construction of the forms be within the tolerances required for the product. They also require that all form-making shops have exits and

firefighting equipment appropriate to the work space, materials, and expected hazards.

Canada also requires that facilities for producing prestressed concrete elements include measuring equipment for setting up and checking alignments and levels. Canada requires that there be adequate dust-collecting and ventilating capabilities when personnel are in woodworking shops where wood or plastic forms are made.

## 2. Reinforcing

Canada requires that work benches or gigs where welding is performed be arranged so that employees are protected from welding flashes and that the areas be ventilated to avoid exposure to excessive welding fumes.

PCI refers to the OSHA General Industry Standards in 29 CFR 1910.217 and requires welding areas to be ventilated and protected to prevent welding flash.

## 3. Stressing

Both Canada and the PCI have safety requirements for stressing operations. The PCI requires that a shield or guard be provided for bed end protection of the jacking area. There are suggestions for the materials for a barrier, but no specific requirements.

## 4. Oiling

There are no unique safety standards in any international or consensus standards that address the tasks of this operation, except those discussing walking and working surfaces in the PCI "Safety and Loss Prevention Manual" [39].

## 5. Mixing

The PCI has no specific safety standards regarding batching and mixing that relate to safety. The Canadian standards require that the batch plant be kept clean at all times.

## 6. Casting

The PCI recommends that gloves, long-sleeved shirts, and long trousers be worn when employees are performing any of the various tasks related to concrete operations, such as shoveling, raking, vibrating, and screeding. The PCI requires that personnel performing the shoveling tasks be trained in proper procedures to reduce the potential for back strains. They also require that extruder hoppers have guards and that all electrical connections be insulated or guarded.

The PCI refers to requirements regarding noise in 29 CFR 1926.52 and CFR 1910.95.

## 7. Stripping

There are no specific requirements in the PCI, ACPA, or Canadian standards that apply to tasks in the stripping operation.

## 8. Curing

The PCI has both recommendations and specific requirements concerning steam, hot oil, electric, and moisture curing. They include requirements for the insulation of steam, hot oil, and hot water lines and for thermostats, timers, and circuit breakers for electric curing.

## 9. Finishing

The PCI "Safety and Loss Prevention Manual" [39] recommends the use of rubbersoled shoes where there are slippery surfaces and requires the use of hard hats, eye protection, knee pads, and gloves in the performance of certain operations; e.g., gloves are required for all finishers working with concrete; eye protection is required while concrete is poured; and eye protection is required whenever finishers are chipping, burning, drilling, or grinding.

During special finishing processes such as sand blasting, the PCI requires adequate exhaust ventilation and respiratory protective equipment. When acid etching is used as a finishing technique, the PCI requires that warning signs be posted and visible, that all caustic and acid products be labeled, and that employees know the location of the nearest portable water supply. It also recommends the use of protective face, hand, foot, and body clothing for employees performing these tasks.

## 10. Materials Handling

PCI refers to 29 CFR 1926.600 for certain general requirements, but also specifies in its "Safety and Loss Prevention Manual" [39] that operators be trained and qualified, be able to pass at least a verbal examination, be specifically designated to a particular task, and make a daily minimum check of their equipment. PCI also requires that the grounds be properly maintained for safe operations and prohibits the carrying or holding of loads over work areas where other employees are present.

The ACPA requires that product handling conform with the standard recommendations in its handbook.

Canada requires that all physical production facilities be laid out, designed, and constructed so that there will be adequate space for materials, storage, equipment, and production facilities, with sufficient capacity so that production can be adequately maintained without adversely affecting the safety of plant, personnel, or products.

The PCI has both general and specific recommendations for yard storage, including storage area, dunnage, stacking, personnel safety, strand, and

rebar storage. They also have recommendations regarding product transportation, including operating rules for driving in hazardous weather. The PCI prohibits the use of drugs and alcohol; it also requires that drivers wear hardhats and safety shoes.

The OSHA General Industry Standards in 29 CFR 1910 [32] regulate safety and health in the precast concrete products industry (SIC 3272); however, the standards do not apply to all operations, tasks, and conditions specific to the industry. Those items in the existing standards that are related to the manufacture and delivery of precast concrete products are presented in Table B-1.

Although SIC Code 3272 is regulated by OSHA standards under 29 CFR 1910, the OSHA construction standards in 29 CFR 1926 contain elements which are related to certain operations within the precast concrete products industry. The standards in CFR 1926 that impact on working conditions in the industry are included in Table B-1 for informational purposes.

#### E. Summary

OSHA General Industry Standards apply to many of the operations, tasks, and conditions typical of precast concrete manufacturing operations. These OSHA regulations address subjects such as walking and working surfaces, handtools, ventilation, noise, fire prevention, respiratory protection, machine guarding, ladders, scaffolding, and welding or cutting. OSHA standards do not, however, regulate some of the tasks, equipment, and operations that are specific to the precast concrete products industry, such as forming, stressing, detensioning, oiling, concrete transport and casting.

Existing international standards and trade association guidelines address many of the hazards that are unique to tasks in the precast concrete industry. PCI provides guidelines for worker protection in such areas as tensioning, architectural and structural product storage, yard layout and cleanliness, product shipping, and steel placement. ACPA guidelines address the areas of pipe handling and unloading.

The recommendations for safe work practices in Chapter IV include applicable standards from OSHA and foreign sources and from trade association guidelines. Additional recommendations are presented to include:

- o Employee training
- o Manual materials handling
- o Housekeeping
- o Personal protective equipment.

TABLE B-1  
 OSHA STANDARDS THAT IMPACT ON THE MANUFACTURE AND DELIVERY  
 OF PRECAST CONCRETE PRODUCTS

Applicable Standard	Area of Impact
1910	
<u>Subpart D</u>	<u>Walking and Working Surfaces</u>
.22	General requirements
.23	Guarding openings & holes
.24	Fixed stairs
.25	Wood ladders
.26	Metal ladders
.27	Fixed ladders
.28	Scaffolding
.29	Mobile scaffolds
<u>Subpart E</u>	<u>Means of Egress</u>
.36	General
.37	Means of egress
<u>Subpart G</u>	<u>Occupational Health and Environmental Control</u>
.94	Ventilation
.95	Noise
.97	Nonionizing radiation
<u>Subpart H</u>	<u>Hazardous Materials</u>
.101	<u>Compressed gases</u> (general requirements)
.102	Acetylene
.104	Oxygen
.106	Flammable and combustible liquids
.110	Storage and handling of liquefied petroleum gases
<u>Subpart I</u>	<u>Personal Protective Equipment</u>
.133	Eye and face protection
.134	Respiratory protection
.135	Occupational head protection
.136	Occupational foot protection
<u>Subpart J</u>	<u>General Environmental Controls</u>
.141	Sanitation
.144	Color coding
.145	Signs and tags

TABLE B-1  
 OSHA STANDARDS THAT IMPACT ON THE MANUFACTURE AND DELIVERY  
 OF PRECAST CONCRETE PRODUCTS (Continued)

Applicable Standard	Area of Impact
1910 (Cont.)	
<u>Subpart K</u> .151	<u>Medical and First Aid</u> Medical services and first aid
<u>Subpart L</u> .157	<u>Fire Protection</u> Portable fire extinguishers
.158	Standpipe & hose systems
.159	Automatic sprinkler systems
.160	Fixed dry chemical extinguishing systems
.161	Carbon dioxide extinguishing systems
.163	Local fire alarm signaling systems
<u>Subpart M</u> .166	<u>Compressed Gas and Compressed Air Equipment</u> Inspection of compressed gas cylinders
.169	Air receivers
<u>Subpart N</u> .176	<u>Materials Handling and Storage</u> Handling materials, general
.178	Powered industrial trucks
.179	Overhead & gantry cranes
.180	Crawler, locomotive, and truck cranes
<u>Subpart O</u> .212	<u>Machinery and Machine Guarding</u> General requirements for all machines
.213	Woodworking machinery requirements
.215	Abrasive wheel machinery
.217	Mechanical power presses
.219	Mechanical power-transmission apparatus

TABLE B-1  
 OSHA STANDARDS THAT IMPACT ON THE MANUFACTURE AND DELIVERY  
 OF PRECAST CONCRETE PRODUCTS (Continued)

Applicable Standard	Area of Impact
1910 (Cont.)	
<u>Subpart P</u>	<u>Tools, Hand and Portable Powered</u>
.242	Hand & portable powered tools & equipment, general
.243	Guarding of portable powered tools
.244	Other portable tools & equipment
<u>Subpart Q</u>	<u>Welding, Cutting and Brazing</u>
.252	Welding, cutting & brazing
<u>Subpart S</u>	<u>Electrical</u>
.309	National Electrical Code
<u>Subpart Z</u>	<u>Toxic and Hazardous Substances</u>
.1000	Air contaminants
1926	
<u>Subpart C</u>	<u>General Safety and Health</u>
.21	Safety training & education
.25	Housekeeping
<u>Subpart E</u>	<u>Personal Protective Equipment</u>
.102	Eye and face protection
.103	Respiratory protection
.104	Safety belts, life lines, and lanyards
.105	Safety hats
<u>Subpart G</u>	<u>Signs, Signals, and Barricades</u>
.201	Signaling
<u>Subpart H</u>	<u>Materials Handling, Storage, Use, and Disposal</u>
.250	General Storage
.251	Rigging equipment
.252	Disposal of waste materials
<u>Subpart K</u>	<u>Electrical</u>
.400	General
.4012	Grounding and bonding
.402	Installation & maintenance

TABLE B-1  
 OSHA STANDARDS THAT IMPACT ON THE MANUFACTURE AND DELIVERY  
 OF PRECAST CONCRETE PRODUCTS (Concluded)

Applicable Standard	Area of Impact
1926 (Cont.)	
<u>Subpart N</u> .550	<u>Cranes, Derricks, and Hoists</u> Cranes and derricks
<u>Subpart O</u> .600 .601 .602	<u>Motor Vehicles</u> Equipment Motor vehicles Materials handling equipment
<u>Subpart Q</u> .700 .701	<u>Concrete, Concrete Forms, and Storage</u> General provisions Forms and storing
<u>Subpart W</u> .1000 .1001 .1002 .1003	<u>Rollover Protective Structures</u> Rollover protection Performance criteria Frame test procedures Overhead protection

Adapted from OSHA General Industry Standards, 29 CFR 1910 [32] and OSHA Construction Industry Standards, 29 CFR 1926 [51].