



# PCI Certification

for plants, personnel, and product erection



Over 40 years of excellence



Certification - Based on the Body of Knowledge for the Precast Concrete Structures Industry



From start to finish, PCI certifies the process of manufacturing and erecting precast and prestressed concrete components. This certification of plants, personnel, and product erection provides greater assurance to owners, architects, engineers, and contractors that precast concrete components will be manufactured and installed according to stringent industry standards.

*PCI Certification ensures quality and competency.*

#### PLANTS

For over 40 years, PCI's Plant Certification Program has ensured that each plant has developed and documented an in-depth, in-house quality system based on time-tested national industry standards. Each plant undergoes two thorough, unannounced audits each year. The audits are conducted by competent, third-party engineers, who audit the plant according to requirements specifically developed for the types of products being manufactured.

#### PEOPLE

The Plant Quality Personnel Certification Program, started in 1985, provides instruction and evaluation for three levels of trained, knowledgeable, and certified quality-control personnel. PCI also trains Certified Field Auditors (CFAs) and Certified Company Auditors (CCAs), who perform the audits to qualify or certify the precast concrete erector. This process extends personnel certification into the field.

#### PRODUCT ERECTION

The Qualified Erector and Certified Erector programs evaluate erection procedures and field quality control for precast concrete. Introduced in 1999, these programs extend PCI's quality performance standards throughout the construction process. The erection company's management and each erection crew are audited according to nationally published criteria, providing customers with the assurance that the product quality created by stringent factory conditions continues into the field during installation.



Knowledgeable specifiers choose PCI-Certified companies because they know the PCI Certification process confirms the ability to manufacture and install quality components according to national industry standards published by PCI.

*PCI Certification provides a high degree of assurance of uniform, consistent products.*



#### **HIGH STANDARDS**

PCI's standards for quality precast concrete production and erection are difficult to achieve. Once attained and practiced consistently, these standards contribute to improved and continued customer satisfaction—not only by ensuring that the manufacturing and installation processes are high quality, but by helping make the construction process faster and smoother for all parties involved.

The standards ensure that plants consistently maintain high-quality operations and output through daily internal control processes and inspections of operations, materials, equipment, products, and processes.

#### **OBJECTIVITY**

All PCI Producer Members are required to maintain PCI Certification for their plants. Producers are not required, however, to join PCI to participate in the PCI Certification Program, ensuring objectivity for the entire process. Owners, architects, engineers, and contractors all benefit when precast concrete components, products, and erection services are provided by PCI-Certified companies.



## CERTIFICATION OFFERS SEVERAL KEY ADVANTAGES



Photo courtesy of PCI and Mid-States Concrete Industries



### PREQUALIFIED BIDDERS

Specifying products from a PCI-Certified plant ensures that bidders have an ongoing quality system in place and a history of quality assurance. PCI-Certified plants are required to develop and maintain a detailed Quality System Manual compiled according to industry standards and approved by PCI. Avoid surprises during the construction process by requiring certification in project specifications.



### PRODUCTION EXPERIENCE

It is easy to identify plants that are certified to produce various types of precast concrete components by referring to PCI's product-specific certification categories. Best of all, the experienced producer can often provide suggestions for challenges that may be encountered.

### LOWER COST

Doing the job right the first time saves material and labor costs while preventing schedule delays. PCI-Certified plants are capable of producing uniform, consistent products that eliminate many potential problems.

### FASTER ERECTION

Using quality products leads to more efficient and safer field operations, which in turn helps prevent schedule delays. Quality-control systems ensure that components are properly identified and delivered in the appropriate number and order and then fit together quickly, often resulting in reduced on-site labor and scheduling costs.



### NO ADDED COST

There is no cost to the owner or specifier for using a PCI-Certified plant. In fact, the efficiencies and processes inherent in a PCI-Certified plant often cut waste and reduce costs associated with repairs, rejected products, and delays.





## CERTIFICATION MEANS UNIFORMITY AND CONSISTENCY

PCI-Certified plants are required to develop and maintain a detailed Quality System Manual that is compiled according to industry standards and approved by PCI.



### PROVEN EXPERIENCE

PCI-Certified precast concrete plants bring to each job a host of skills and efficiencies that can aid the construction process, especially if the precaster is brought into the design process early. The precaster can provide input on dramatic architectural effects, efficient sizes and shapes, value-engineering options, state-of-the-art connection systems, and other aspects that produce aesthetically pleasing, functional, and cost-effective precast concrete designs.

### PRODUCT CATEGORIES

Precast plants may be certified in as many as four general groups or products: Group A—Architectural Products; Group B and BA—Bridge Products; Group C and CA—Commercial (Structural) Products; and Group G—Glass-Fiber-Reinforced Concrete (GFRC) Products. Architectural and GFRC producers manufacture specially finished precast concrete components and cladding for buildings and other structures. Bridge producers in Group B manufacture concrete girders, decks, piers, and other products used in bridges. Commercial producers in Group C provide a wide range of primary and secondary structural products for commercial buildings.

Precasters may be certified in Group BA rather than B, or in CA rather than C. Group BA or CA producers have demonstrated expertise with applications of special architectural finishes that add to the product's aesthetic appeal.

### PUBLISHED STANDARDS

Three of the product groups are divided into categories that identify more-specific product types, conveying the special expertise and capability of individual plants. The categories reflect similarities in the ways the products are manufactured. Product groups are audited according to the standards and provisions of one of three PCI Quality-Control Manuals.



## CERTIFIED PLANT PROGRAM

**Categories are listed in ascending order. That means a plant certified to produce components in a latter category is also certified for products in the preceding categories. For example, a plant certified in category C3 (or C3A) is certified for products in categories C1 (or C1A) and C2 (or C2A), but not for C4 (or C4A).**

### ARCHITECTURAL

Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products (MNL-117)

Architectural precast concrete products, through their finish, shape, color, or texture, contribute to a structure's architectural expression. These products may be custom designed or feature standard shapes. They may be manufactured with conventional mild-steel reinforcement, or they may be pretensioned or post-tensioned. These products typically have more stringent requirements for dimensional tolerances.

#### AT — Miscellaneous Architectural Trim Units

Includes mullions, bollards, urns, railings, sills, copings, benches, planters, pavers, and other types of miscellaneous shapes.

#### A1 — Architectural Precast Concrete Products

Includes exterior cladding, load-bearing and non-load-bearing wall panels, spandrels, beams, columns, and all products covered in AT.

### BRIDGES

Manual for Quality Control for Plants and Production of Structural Precast Concrete Products (MNL-116)

Bridge components consist of precast concrete or precast, prestressed concrete products and are usually produced with gray cement and local aggregates. Those in Group BA have form, machine, or special finishes.

NOTE: Some precast bridge products are not automatically covered in routine plant audits. These include highway median barriers, box culverts, and three-sided arches. These products are audited at the request of the precaster or if PCI Certification is required by the project specifications.

#### B1 — Precast Bridge Products (No Prestressed Reinforcement)

Mild-steel-reinforced precast concrete elements, including some types of bridge beams or slabs, as well as products such as piling, sheet piling, pile caps, retaining wall elements, parapet walls, and sound barriers.

#### B2 — Prestressed Miscellaneous Bridge Products

(Non-superstructure)

Any precast, prestressed elements except for superstructure beams. This includes piling, sheet piling, retaining-wall elements, stay-in-place bridge deck panels, full-depth deck panels, and all products covered in B1.

#### B3 — Prestressed Straight-Strand Bridge Beams (Superstructure)

All precast, prestressed superstructure elements using straight, pretensioning, or post-tensioning strands such as box beams, I-girders, bulb-tee beams, stemmed members, solid slabs, segmental box beams, and all products covered in B1 and B2.

#### B4 — Prestressed Deflected-Strand Bridge Beams (Superstructure)

Precast concrete bridge members that are reinforced with deflected pretensioning or post-tensioning strand. Included are box beams, I-girders, bulb-tee beams, stemmed members, solid slabs, and all products in B1, B2, and B3.

#### BA — Bridge Products with an Architectural Finish

These products are the same as those in Group B, but they are produced with an architectural finish. They will have a form, machine, or special finish. Certification for Group BA production supersedes Group B in the same category.



**COMMERCIAL****Manual for Quality Control for Plants and Production of Structural Precast Concrete Products (MNL-116)**

This group includes structural and nonstructural precast or precast, prestressed concrete elements for buildings and other structures. These products have no special architectural finish and may be suitable for painting if specified.

**C1 — Precast Concrete Products (Nonprestressed)**

Conventionally reinforced precast concrete elements, including piling, sheet piling, pile caps, retaining-wall elements, floor and roof slabs, joists, stairs, seating members, columns, beams, walls, spandrels, and similar products.

**C2 — Prestressed Hollow-Core and Repetitively Produced Products**

Precast concrete products that are prestressed with straight, pretensioning, or post-tensioning strands. Included are hollow-core slabs for floor, roof, and wall construction that may be wet cast, machine cast, extruded, or slip formed. Other products include railroad ties, flat slabs, wall panels, utility poles, and all products in C1.

**C3 — Prestressed Straight-Strand Structural Members**

Precast concrete structural members that are prestressed with straight, pretensioning, or post-tensioning strands. Included are stemmed members for roofs, floors, and walls, as well as beams, columns, spandrels, joists, seating members, and all products in C1 and C2.

**C4 — Prestressed Deflected-Strand Structural Members**

Precast concrete structural members made with deflected pretensioning or post-tensioning strands for roofs and floors, beams, joists, and all products in C1, C2, and C3.

**CA — Commercial Products with an Architectural Finish**

These products are the same as those in the categories within Group C, but they are produced with an architectural (form, machine, or special) finish. Certification for Group CA production supersedes Group C in the same category.

**GFRC****Manual for Quality Control for Plants and Production of Glass-Fiber-Reinforced Concrete Products (MNL-130)****G — Glass-Fiber-Reinforced Concrete Products**

These architectural products are made by spraying a cement/sand slurry reinforced with glass fiber into molds. The products are custom designed and contribute to a structure's architectural expression through their finish, shape, color, or texture. The range of products is similar to the non-load-bearing units in category A1.





# PLANT CERTIFICATION GUIDE SPECIFICATIONS

## MANUFACTURER QUALIFICATIONS

The precast concrete manufacturing plant shall be certified under the PCI Certified Plant Program. The manufacturer shall be certified at the time of bidding. Certification shall be in the following product group(s) and category(ies):

### GROUP A – ARCHITECTURAL PRODUCTS

AT – Architectural Trim Units

A1 – Architectural Precast Products

### GROUP B OR BA – BRIDGE PRODUCTS

B1 or B1A – Precast Bridge Products (No Prestressed Reinforcement)

B2 or B2A – Prestressed Miscellaneous Bridge Products (Non-superstructure)

B3 or B3A – Prestressed Straight-Strand Bridge Beams (Superstructure)

B4 or B4A – Prestressed Deflected-Strand Bridge Beams (Superstructure)

[Group BA products require an architectural finish.]

### GROUP C OR CA – COMMERCIAL (STRUCTURAL) PRODUCTS

C1 or C1A – Precast Concrete Products (No Prestressed Reinforcement)

C2 or C2A – Prestressed Hollow-Core and Repetitive Products

C3 or C3A – Prestressed Straight-Strand Structural Members

C4 or C4A – Prestressed Deflected-Strand Structural Members

[Group CA products require an architectural finish.]

### GROUP G – GLASS-FIBER-REINFORCED CONCRETE PRODUCTS (GFRC)



### Notes to Specifiers:

Categories in Product Groups A, B, and C are listed in ascending order. For example, a plant certified to produce products in Category C4 is automatically certified to produce products in the preceding Categories C1, C2, and C3. However, a plant certified to produce products in Category C2 is certified for Category C1 but is not certified for Categories C3 or C4.

In addition, Group BA or CA supersedes Group B or C in the same category. For example, a plant certified to produce products in Category C2A is certified for Categories C1, C1A, and C2, but it is not certified for Categories C3, C3A, C4, or C4A.

A product group and category should be determined and shown in the specifications for each type of precast concrete product used in a project. This will allow more than one pre-caster to submit bids on individual products. For example, a pre-caster with expertise in producing prestressed piling (with certification in C2) could submit a bid for only piles on a project that also included prestressed double-tees. Similarly, a producer with certification in C4 could submit a bid for the tees that either included or excluded the piling.

Important: Specify the most appropriate product group and category for the project. Do not select a higher category than necessary. Similarly, do not add "A" to a listing when it is not necessary to meet project requirements. Selecting an inappropriate group or category could restrict the number of available bidders.



These guide specifications will help you select qualified precast concrete manufacturers to bid on your project. PCI suggests that the process start by listing the various precast concrete products required for the project, then determining the appropriate product group and category for each product based on the product's use, the method of reinforcement, and special surface finishes. In the specifications, list each precast concrete product and each required group and category included in the project's scope. Refer to the "Notes to Specifiers" for additional discussion information. See [www.pci.org/certification](http://www.pci.org/certification) for more information.



### PLANT QUALITY PERSONNEL CERTIFICATION

Conducting an effective quality-control program requires knowledgeable and motivated testing and inspection personnel. These employees must understand the key ingredients that produce overall quality, the specifics of how each product is manufactured, and how to conduct precise tests and inspections. PCI has been training quality-control personnel since 1974 and published its first technician training manual in 1985. Three distinct levels of Plant Quality Personnel Certification can each be achieved by passing a written PCI examination:

#### LEVEL I

This basic level requires six months of precast concrete industry experience (or other educational, technical, or professional criteria). Level I certification focuses on the fundamental requirements of the many quality-control issues typically encountered in a precast plant. Requirements also include current certification by the American Concrete Institute in the Concrete Field Testing Technician Program, Grade 1.

#### LEVEL II

Level II certification provides greater detail in maintaining and improving quality levels, such as tensioning and strand-elongation corrections, effects of accelerated curing, material-control tests, welding basics, and a variety of plant topics. Requirements include PCI Level I and one year of precast concrete industry experience (or other educational, technical, or professional criteria).

#### LEVEL III

The highest level of certification provides significant instruction in concrete materials and technology. Certification requires two years of precast concrete industry experience, attendance at a four-day PCI school, and PCI Level II certification.

### FIELD QUALITY PERSONNEL CERTIFICATION

#### CERTIFIED FIELD AUDITOR (CFA)

This program, instituted in 1999, provides certification for personnel trained to conduct field audits of industry erection procedures and evaluate compliance with PCI standards. CFA certification requires a minimum of two years of precast concrete erection experience and a commitment to upholding professional standards appropriate to the program. Certification helps ensure that the high quality achieved in the plant is maintained throughout installation.

#### CERTIFIED COMPANY AUDITOR (CCA)

PCI-Certified company auditors perform the company audits that lead to PCI-Certified Erector status. CCA certification requires two years of acceptable experience in the supervision of the erection of precast concrete and current CFA certification.



Photo courtesy of PCI and Mid-States Concrete Industries



PCI has two comprehensive certification programs for employees of companies involved in precast concrete manufacture or erection. The Plant Quality Personnel Certification Program ensures that precast plant workers have extensive technical knowledge and training that aid in producing consistent, high-quality products. The Field Quality Personnel Certification Program brings the quality program into the field by training personnel on industry erection standards and best practices for conducting field audits or erection processes.



# CERTIFIED PERSONNEL GUIDE SPECIFICATION



PCI-Certified plant personnel are required by the PCI Plant Certification Program.

## PERSONNEL CERTIFICATION BENEFITS

Owners, architects, engineers, and contractors all benefit by working with precast concrete plants and erectors that employ PCI-Certified quality-control personnel and auditors. These professionals can effectively and efficiently develop and implement a quality-control program, and in many other ways help improve the quality component of the precaster. Their input can help companies cut costs even as they produce better and more efficient precast concrete components and building systems.

Demand for qualified personnel continues to grow. Plant Quality Personnel Certification is required by over one-third of state departments of transportation. These agencies require PCI Certification not only for plant personnel but also for their own materials inspectors and quality-assurance personnel.

Achieving Plant Quality Personnel Certification status is a demanding task, but those who rise to the challenge improve their proficiency and provide better service to the precast concrete industry. PCI Certification is a reliable means for ensuring that the precaster working on your project meets the highest possible industry standards.

## PERSONNEL QUALIFICATION GUIDE SPECIFICATION

The project specifications should require trained and certified quality-control personnel in the manufacturing plant. PCI recommends that the manufacturer employ personnel according to the following Personnel Qualifications specifications:

The manufacturer shall employ a minimum of one person, regularly present in the plant, who is certified by PCI for Plant Quality Personnel, Level II.

Note: All PCI-Certified plants are required to employ at least one PCI-Certified individual.





# QUALIFIED AND CERTIFIED ERECTOR PROGRAMS



CATEGORY S1  
(Simple Structural Systems)

This includes horizontal decking members (such as hollow-core slabs on masonry walls), and single-lift wall panels attached to a structure.



CATEGORY S2  
(Complex Structural Systems)

This includes everything contained in S1 as well as total-precast concrete construction, multiproduct structures (those that combine vertical and horizontal members), and single- or multistory load-bearing members, including those with architectural finishes.



CATEGORY A  
(Architectural Systems)

This includes non-load-bearing cladding and GFRP products, which may be attached to a supporting structure.

## PROGRAM BENEFITS

PCI's Qualified Erector and Certified Erector programs extend the Institute's demanding quality standards to the process of erecting the finished precast concrete product components in the field. These programs provide assurance that the high-quality precast concrete components produced by a PCI-Certified Plant are erected to the exacting standards expected by the owners, developers, architects, contractors, and the precast concrete industry as a whole.

The erection process is vital to the overall performance of the finished precast concrete products in the structure. Handling pieces properly and installing them correctly require well-trained erection personnel who understand every aspect of lifting, maneuvering, and connecting each precast concrete piece regardless of its shape or size. An erector may qualify in one of two structural classifications and/or an architectural classification (categories S1, S2, and A, defined at left).

The entry-level PCI Qualified Erector Program is designed to provide assurance that individual erection crews have the skills, procedures, and supervision necessary to conduct erection operations in accordance with essential safety and quality criteria published by PCI. Each PCI-Qualified crew is audited twice each year by a PCI-Certified Field Auditor, with at least one of the two audits conducted by an independent auditor.

The more-advanced PCI Certified Erector Program is designed to provide assurance that the erecting organization has the managerial and administrative capability to achieve and sustain performance consistent with requirements established by PCI, the producer, and the owner/specifier. It represents the highest commitment to safety and quality an erector can achieve under the PCI Quality Assurance System. Each crew of a PCI-Certified Erector is audited twice each year by a PCI-Certified Field Auditor, as required by the Qualified Erector Program. In addition, the organization's quality

documents, safety and erection procedures, personnel-qualification records, project files, and equipment-management records are audited annually by an independent third-party PCI-Certified Company Auditor to ensure that the required managerial and administrative criteria are being met on all applicable projects.

### Guide Specification for PCI-Qualified Erectors:

"Erector Qualification: Prior to beginning any work at the jobsite, all crews erecting precast concrete shall be qualified in category[ies] [A, S1, and/or S2] under the Precast/Prestressed Concrete Institute (PCI) Erector Qualification Program."

### Guide Specification for PCI-Certified Erectors:

"Erector Certification: Prior to beginning any work at the jobsite, the erecting organization, including all crews erecting precast concrete, shall be certified in category[ies] [A, S1, and/or S2] under the Precast/Prestressed Concrete Institute (PCI) Erector Certification Program."



# Body of Knowledge

## The Foundation of Certification

When you specify certification from the Precast/Prestressed Concrete Institute (PCI), you are backed by an entire industry's experience and expertise. PCI Certification is based on, and an integrated part of, the Body of Knowledge (BOK) for the precast concrete structures industry. The BOK refers to the collective knowledge of an industry that is relied upon to design and build with a specific material or system. It is from this BOK that building codes, design guides, education programs, certification, and more are derived. Certification programs developed, managed, and maintained by an industry's technical institute, where an industry's BOK lives, offer the greatest probability of meeting or exceeding project specifications, applicable codes, and industry standards, while minimizing risk.

PCI is the technical institute for the precast concrete structures industry. PCI develops, maintains, and disseminates the BOK necessary for designing, fabricating, and constructing precast concrete structures. It was founded in 1954 by the engineers and firms that pioneered prestressed concrete technology in the United States. Knowledgeable specifiers choose PCI-Certified plants, personnel, and erectors because they know the PCI Certification process confirms the ability to manufacture and install quality components according to national industry standards. To learn more about the BOK and PCI as a technical institute, visit [www.pci.org](http://www.pci.org).



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