

ADDENDUM October 2018

Updates for the 14th Edition NPCA QC Manual

QCM-001, Rev. 1, effective 1-1-19

At its mid-year meeting in June, the NPCA Quality Assurance Committee has again raised the bar on quality for the NPCA Plant Certification program by changing the maximum inspection score, adding a continuous improvement option and reducing scores for repeated deficiencies.

The format for notifying members and certified plants of these changes will not change in 2019. Members and certified plants be notified of changes in Certification Express emails distributed to the designated primary and secondary contacts. A letter outlining changes will also be mailed to the liaison to the auditor for each certified plant location.

The 14th Edition of the Quality Control Manual will include several changes, additions and editorial updates that will take effect at the start of the 2019 program year. Please see the posted manual for all of the editorial changes made in blue text. Members will have the opportunity to review and comment on the changes during a 60-day comment period from Nov. 1, 2018 to Dec. 31, 2018.

Changes to Program Grading:

Inspection scores have increased the past five years. Each year, the QA Committee has addressed score inflation both internally (making changes to the NPCA QC Manual requirements) and externally (demanding more from our third-party inspection agencies and providing auditors additional and more focused training) to increase program value to members and industry. The QA Committee has also been studying the audit process while NPCA has provided training to plant auditors to ensure they understand the processes and the grading model for the program.

To address scoring concerns, the QA Committee voted at its June 2018 meeting to reduce the maximum possible plant score to 92% (points obtained/points possible) which is approximately two standard deviations of the last five year scoring population. The QA Committee also voted to add a new Continuous Improvement section to the QC Manual to provide plants the opportunity to score above 92% by participating in Continuous Improvement activities. Additional details on Continuous Improvement can be found in Section 1.1.4 and in the Plant Terms and Conditions Part 2.5 of the NPCA Quality Control Manual for Precast Concrete Plants.

In another change to program grading, the QA Committee voted to assess a scoring penalty of 0.25% off the final audit score for each repeat deficiency from the plants previous inspection. This action was taken to hold certified plants accountable for actions to correct the deficiency and prevent recurrence. Those actions are submitted in writing to NPCA and the audit agency after each plant inspection.

The QA Committee also voted and approved the following changes to the 14th Edition effective in program year beginning January 2019.

The Table of Contents has been renumbered to accommodate expanded and/or new language throughout the manual as detailed below.

Under FOREWORD:

Updated the Quality Assurance Committee roster to reflect the membership of the 2017 – 2018 committee members.

The first edition of the NPCA QC Manual was published in 1987 in consultation with the members of the National Precast Concrete Association and has been revised regularly since then. The **fourteenth** edition, **January 2019** of the NPCA QC Manual was approved **June 2018** by NPCA's Quality Assurance committee.

NPCA Quality Assurance Committee Members **(2017 - 2018):**

- Andrew Nashawaty, Scituate Concrete Pipe Corp. (Chairman)
- Richard Alvarado, Western Precast Concrete Inc. (Board Liaison)
- Eric Barger, C.R. Barger & Sons Inc.
- Frank Bowen, Rosetta Hardscapes
- Theodore Coons, Spillman Company
- Lynn Grimm, Lindsay Precast Inc
- Andrew Hayward, Panhandle Concrete Products Inc.
- Bryan Lee, Utah Department of Transportation
- Brian Lins, ELE International
- Hugh Martin, Oldcastle Precast Inc.
- Rusty Stever, Jensen Precast
- Troy Taguma, Hawaii Precast
- Jason Tucker, Texas Department of Transportation
- Javier Vela, Forterra Pipe and Precast
- James Walker, Wilbert Vaults of Houston

Under 1.1.2 Plant-Specific Quality Control Manual:

In the Commentary; annual was changed to 'a minimum of every twelve (12) months'. In addition under 1.1.2.17; added 'or licensing

STANDARD

COMMENTARY

CHAPTER 1 - GENERAL

1.1 PLANT QUALITY CONTROL PROCEDURES AND MANAGEMENT POLICIES

1.1.1 Plant Management and Personnel

Plant management and personnel must be committed to the production of a consistently high-quality product. Understanding the company policies and a commitment to quality is essential. Frequent training reinforces this commitment. Also, personnel must be given the authority to enforce minimum Quality Control (QC) policy over production requirements. The organizational structure of a precast concrete plant shall include the implementation of a Quality Control Program, which is the responsibility of the general manager or chief executive officer.

Management must support and be dedicated to the production of quality products; otherwise, a Quality Control Program is unlikely to be successful. The plant QC Policy Statement should clearly state the management's commitment to producing high-quality products. This

policy should be frequently discussed with employees and customers.

A person not directly involved in production and who is responsible to the general manager or chief executive officer administers quality control functions most effectively.

The use of fly ash or granulated blast furnace slag as cementitious materials in concrete mix designs qualifies for the use of reclaimed materials. Reclaimed crushed concrete as an aggregate or as a surface finish is another use of a reclaimed material.

Note: Use of supplementary cementitious materials (SCMs) must comply with the appropriate ASTM and ACI test methods and standards.

NPCA supports construction sustainability and advocates good stewardship of the environment. Producers are encouraged to use and document the use of reclaimed materials in manufactured products. Manufacturers seeking LEED (Leadership in Energy and Environmental Design) status for their projects must document the use of reclaimed materials.

1.1.2 Plant-Specific Quality Control Manual

The plant shall have a plant-specific QC manual that details the production and QC policies and procedures used by the plant. The manual shall be compiled in one notebook or binder for easy review by plant personnel or by an inspector. At a minimum, the manual shall include the requirements of this manual and the following sections:

1. Management QC policy statement
2. Company QC personnel organizational chart
3. Description of responsibilities for QC personnel
4. Description of training requirements for QC personnel, production staff, forklift operators and drivers.
5. Housekeeping plan

*A plant-specific quality control procedural manual should specifically define any attributes or practices unique to the plant. The plant specific manual should be reviewed a **minimum of every twelve (12) months** and updated as necessary.*

Standard Operating Procedures (SOP) are a good way to define QC expectations.

A review process of all QC records should be

6. Product pre-pour, casting, post-pour and final inspection procedures
7. Plant curing procedures for all seasons
8. Minimum strength requirements for stripping and shipping product
9. Product repair policy and procedures
10. Product dimensional tolerances
11. Form tolerances and maintenance policy
12. Mix design qualification and testing procedures
13. Raw material testing policy and procedures
14. Equipment calibration policy and procedures
15. Product performance test policy and procedures applicable to Chapter 6
16. Examples of all documentation and forms used by plant to record QC and production processes
17. Documentation of products manufactured under franchise **or licensing** agreements, including all design specifications and drawings.

incorporated into the plant's QC operations with the intent of continually improving operations and quality. This can include a periodic review of documentation indicating nonconforming materials, production procedures and/or products and establishing appropriate corrective action.

Products manufactured under the International Building Code (IBC) may require the Professional Engineer to be the Professional of Record (POR) for the certification of Special Inspections performed by the QC personnel of a producer seeking Precertified Plant status. The local building official can grant Precertification Status.

Under 1.1.3 QC Personnel Training:

In the Commentary; Master Precaster has been added to the listing as applicable since there are continuing education requirements to maintain Master Precaster designation.

STANDARD

COMMENTARY

Because of the importance of properly trained personnel, training must remain current. Courses available for retraining every five years in the NPCA Production and Quality School (PQS) are:

PQS Level I

PQS Level I Refresher

PQS Level II QA/QC

PQS Level II Technical

PQS Level II Production

PQS Level II Safety

PQS Level III Leadership

Master Precaster

Under 1.1.4 Continuous Improvement:

A new section has been added to the manual for program year 2019. Continuous Improvement is added as an option to NPCA Certified Plants to enhance the benefits of the program and provide for continued growth for plants quality systems and operations.

STANDARD

COMMENTARY

1.1.4 Continuous Improvement

The plant shall engage in annual continuous improvement activities and keep on file objective evidence of these activities in the form of documentation, policies and procedures, and visual example.

By definition, 'continuous improvement' is an ongoing effort to improve products, services or processes. Organizations efforts can seek incremental improvement over time or breakthrough improvement all at once.

Continuous improvement activities shall be demonstrated in one or more of the following areas:

- 1. Product
- 2. Processes
- 3. Facilities
- 4. Operational

Examples of Continuous Improvement Activities that qualify include, but are not limited to:

In order to be considered for continuous improvement points, the plant shall first, at a minimum do two of the following:

Production: Documented rearrangement of the production floor based on work flow or new product introduction. Process: A documented 5s or 6s activity in the plant. Process: Batching Kaizen – using quality data (raw material data, mix data, plastic testing, compressive testing) to drive mix optimization, cost reductions and process stability. Operational: A document control program for all plant documents. Facilities: Expansion or additions to production or office spaces improving efficiencies.

- 1. Actively participate in the Producer Portal (see Part 2.5 of the Plant Terms and Conditions);
- 2. Perform semi-annual self-audits using the self-audit tool available in the Producer Portal (see example Self-Audit report in Appendix B);
- 3. Educate plant staff beyond quality personnel (see Part 2.5 of the Plant Terms and Conditions).

Under 2.1.2.2 Deleterious Substances:

STANDARD

2.1.2.2 Deleterious Substances

Fine and coarse aggregate from all suppliers shall be tested for deleterious substances initially, then one year at the end of the month from the date of the last test thereafter and whenever the aggregate is suspected of contamination. Deleterious substance testing must conform to the requirements and limits stated in ASTM C33 "Standard Specification for Concrete Aggregates."

**Under 2.1.7 Plant Requirements:
STANDARD**

2.1.7 Plant Requirements:

1. The following documentation shall be maintained current in the plant records:
 - Cement and supplementary cementitious material **certified** mill test reports **or certificates for each shipment or lot,**
 - Aggregate supplier and test reports,
 - Mix water potability test reports or other test records indicating the acceptability of the mix water. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification. Municipal water supply is acceptable without testing.**
 - Chemical admixture and other additive **certified test reports or certifications shall be dated not more than one year at the end of the month from the date of the last test or certification.**

2. Documentation of conformance to ASTM C33 (excluding gradation testing) and test reports indicating that the aggregates are non-reactive and stable shall be maintained for each aggregate source used. Such documentation shall be obtained from the supplier, an appropriate state agency, or a testing laboratory engaged by the plant, a minimum of once per year for each material used. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**
The maximum aggregate size shall be proper for the products being cast.

Tests for aggregate gradation and deleterious substances shall be performed at the minimum frequency. Lightweight aggregate shall be tested for gradation and unit weight at the minimum frequency.

3. Records of incoming raw materials and plant materials tests shall be kept current and on file for a minimum of three (3) years.

4. The cement type, supplementary cementitious materials, and chemical admixtures shall be appropriate for the intended use.

**Under 2.3.7 Plant Requirements:
STANDARD**

2.3.7 Plant Requirements:

1. Commercial lifting inserts and hardware shall be certified and posted for maximum capacity. As a minimum, inspect all lifting apparatus and maintain inspection records in the plant files. **Current inspection reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**
2. Non-commercial lifting inserts and hardware shall be proof-tested by a certified testing lab for the rated working load limit (WLL). A factor of safety in compliance with the requirements of the OSHA regulation 29 CFR 1926.704 (c & d) shall be met.
3. Embedded steel shall be protected from corrosion when necessary and dissimilar metals shall not be in contact.

Accessories and fiber reinforcement shall be appropriate for their intended use.

**Under 3.1.5 Admixtures:
STANDARD**

3.1.5 Admixtures

Admixtures shall be used in accordance with the manufacturers' instructions. If more than one admixture is used in a concrete mix, data shall be obtained to assure that each admixture performs as required without adversely affecting the performance of the others. Admixtures shall be introduced into the concrete mix in a controlled manner to assure uniform distribution into the mix.

Admixture supplier shall supply certification of admixture dosing equipment. **Current certifications shall be dated not more than one year at the end of the month from the date of the last test or certification.**

**Under 3.2.4 Batching and Mixing:
STANDARD**

3.2.4 Batching Equipment

Weigh batching equipment shall be maintained and operated in accordance with ASTM C94 or ASTM C685.

For plants that utilize mass batching or a combination of mass and volumetric (for liquid) batching, the equipment must be capable of measuring and batching the concrete raw materials within the following tolerances:

Cement than	±1%; for batches less than
+4%	1 cubic yard, 0 to
Water	±1%
Fine Aggregates	±2%
Coarse Aggregates	±2%
Cumulative Weigh Batch Aggregate	±1%
Admixtures bag of	±3% or ± dosage per cement, whichever is greater

Scales shall be calibrated **each year** or any time there is a reason to question their accuracy. Calibration stickers shall be displayed prominently at the batch control location. **Current calibration and stickers shall be dated not more than one year at the end of the month from the date of the last test or certification.**

Records for calibration of batch plant scales shall be readily accessible to the equipment operator.

Scale calibrations shall include the entire anticipated range of use and the percent error at each test weight shall be documented. Scales shall be calibrated to within 0.2% of the certified test weight at each quarter of the anticipated load range.

Liquid admixtures shall be measured by weight or volume. Powdered admixtures shall be measured by weight. Calibration of the admixture dispensers shall be performed **each year. Current calibration reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

Plants that utilize volumetric or continuous batching shall be capable of proportioning the component materials in concrete within the following tolerances:

Cement	0 to + 4% (weight)
Water	±1% (weight or volume)
Fine Aggregates	±2% (weight)
Coarse Aggregates	±2% (weight)
Admixtures	±3% (weight or volume)

**Under 3.2.9 Plant Requirements:
STANDARD**

3.2.9 Plant Requirements:

1. Aggregate stockpiles shall be properly configured to minimize segregation and contamination.
2. Scales shall be calibrated **each year** and the calibration sticker displayed prominently at the concrete batch control station. **Current calibration reports and stickers shall be dated not more than one year at the end of the month from the date of the last test or certification**
3. Batching tolerances for all concrete components shall conform to the tolerances listed in Section 3.2.4.
4. Mixers shall be checked **daily** for cleanliness, clearances on blades and shoes, proper gate seals, lockout controls, etc.
5. Ready-mixed supplied concrete shall be from a NRMCA or State DOT certified plant or conform to all above requirements. Documentation of the ready mix supplier's conformance shall be maintained in the files at the precast plant. Truck delivery receipts and any water added at the precast plant shall be documented. Only fresh concrete intended for the precast concrete manufacturer is permitted to be used for production of precast concrete products.
6. Daily reports of actual concrete mix proportions used in each batch and concrete quantities produced shall be kept by the precast plant for at least three (3) years.

**Under 4.1.3 Forms and Forming Equipment:
STANDARD**

4.1.3 Forms and Forming Equipment

Forms and forming equipment for manufacturing precast products shall be of a quality that prevents product damage due to forces and vibrations subjected to the forms.

All forms and forming equipment (including pallets, headers, truing rings) shall be measured prior to initial use and not less than **each year thereafter** for dimensional conformance with applicable tolerances. **Current reports shall be dated not more than one year at the end of the month from the date of the last report.**

Forms shall be carefully cleaned of concrete build-up after each use. Coatings of form release agents shall not be allowed to build up.

Forms for manufacturing precast concrete products shall be of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected can cause no product damage.

Under 4.1.7 Plant Requirements: STANDARD

4.1.7 Plant Requirements:

1. Maintain an active housekeeping plan. Continual efforts shall be made by all production personnel to maintain a clean work area. Spot-check by QC Inspector at least once each work shift.
2. Maintain records of form and forming equipment dimensional checks on all new equipment and **each year** thereafter. **Current reports shall be dated not more than one year at the end of the month from the date of the last report.**
3. Maintain inspection records of all handling equipment in accordance with applicable requirements.
4. For reinforcement fabricated with mechanized equipment and used in machine-cast, or dry-cast products, perform and document reinforcing checks on a minimum of one (1) reinforcing cages or 3% of each production run daily, whichever is greater. At least one cage shall be checked when a shift change occurs during the course of a production run and whenever a setting is changed.
5. For machine-cast and/or dry-cast products, dimensional checks shall be performed and documented on a minimum of one (1) products or 3% of each production run daily, whichever is greater.
6. Appearance of architectural precast concrete shall match approved samples and meet industry standards. Compatibility of veneers shall be established and documented. Production and quality control measures shall be developed and documented in the plant-specific QC manual.

7. Unless otherwise noted, maintain records for a minimum of three (3) years.

On page 48 under 4.2.4 Fabrication and Positioning of Blockouts:

STANDARD

4.2.4 Fabrication and Positioning of Blockouts

Blockouts may be made of any rigid, non-absorptive material that will not harm the concrete and that can be held in place during the casting and curing of concrete. Dimensional blockout tolerances shall be specified for each product and blockout type.

Blockouts **may** be held in place during casting with non-corrosive supports **or** with reinforcing steel, **unless prohibited by project specifications.**

On page 48 under 4.2.5 Plant Requirements:

STANDARD

4.2.5 Plant Requirements:

1. Reinforcement shall be fabricated within applicable tolerances and supported rigidly.
2. Welding of ASTM A615 reinforcing steel is allowed when following an approved welding procedure meeting the requirements of AWS D1.4/D1.4M. Copies of the approved welding procedure shall be included in the Plant Specific Quality Control Manual and available for review.
3. Blockouts shall be non-absorptive and held rigidly in place with non-corrosive supports **or with reinforcing steel, unless prohibited by project specifications.**

Under 5.1.1 Raw Material & Test Records:

STANDARD

5.1.1 Raw Material & Test Records

Records of incoming raw materials and certifications, credentials of third party personnel and calibration records for third party and/or plant owned test equipment shall be kept by the precast plant for a minimum of three (3) years. These records shall at a minimum include the following:

COMMENTARY

- a. Cement mill **test reports and** certificates
- b. Aggregate **certifications and** reports
- c. Mix water potability or suitability tests
- d. Chemical admixture and supplementary cementitious material **test reports and** certifications
- e. Reinforcement mill certifications
- f. **Fiber-Reinforcement certification**
- g. Joint sealant, gasket and connector supplier **certifications and test** reports
- h. Accessories supplier **certifications and** reports
- i. Batching records or ready-mixed concrete delivery tickets
- j. Buy America Provisions as required by specific project
- k. Certificate of compliance for all lifting inserts
- l. Laboratory Accreditation or ACI certificates and test equipment calibration records of any third party firm or testing agency.

Records that require annual certifications and/or test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

Example: Aggregates were certified by the quarry to meet ASTM C33 on March 15 of the current year. Aggregates would need to be recertified by the quarry no later than March 31 of the following year.

Under 5.1.3 Equipment Calibration Records: STANDARD

5.1.3 Equipment Calibration Records

Records for calibration of equipment shall be maintained so that the equipment operator has ready access to the records. Current calibration stickers shall be attached to and prominently displayed on all equipment requiring calibration. All of the following equipment shall be calibrated a minimum of once per year. **Current calibration reports shall be dated not more than one year at the end of the month from the date of the last calibration or certification.**

- Concrete batching scales
- Water meters
- Admixture batching equipment
- Concrete compression test machines
- Portable scales
- Air meter
- Density (Unit weight) bucket
- Rebound hammer (if used)
- Temperature recorders and clocks

- Three-edge bearing test machines
- Pipe and manhole measuring devices (i.e., go-no-go gages)
- Vacuum and hydrostatic testing equipment

Calibration of batching scales, compression testing machines and three-edge bearing testing machines shall be performed by an independent, third-party calibration company. All other calibrations shall be performed in-house, by the supplier, or by an independent, third-party calibration company.

**On page 75 under 5.2.2.1 Conventional and/or Dry-Cast Concrete:
STANDARD**

5.2.2.1 Conventional and/or Dry-Cast Concrete

For conventional and/or dry-cast concrete, aggregate surface moisture content (i.e., water in excess of that absorbed by the aggregates) shall be determined at least once per day in accordance with ASTM C70, "Standard Test Method for Surface Moisture in Fine Aggregate," by alternate methods such as moisture meters or probes, or by ASTM C566, "Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying." Drying aggregate using a microwave or hot plate shall be permitted in addition to using an oven.

For conventional and/or dry-cast processes when aggregate bins fitted with moisture probes or meters, aggregate surface moisture content shall be determined a minimum of once per week in order to validate moisture probe **calibration accuracy and performance.**

**On page 80 under 5.3.5.4 Compressive Strength Specimens:
STANDARD COMMENTARY**

5.3.5.4 Compressive Strength Specimens

At least four compressive strength specimens shall be made for each 150 cubic yards (115 cubic meters) of concrete of each mix or once per week, whichever occurs first. Two specimens shall be tested at or before 7 days and the other two shall be tested at 28 days or at the age specified by the design. Specimens made in cylinder molds shall be tested in accordance with ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."

It is generally not necessary to perform the 28-day tests if the results of the 7-day tests exceed the 28-day strength requirement. Nevertheless, it is useful to perform the 28-day tests on some specimens to establish a relationship between the

Cubes or cores cut from products shall be tested in accordance with ASTM C42, "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."

28-day and earlier tests and to validate the performance and establish statistical data for the mix.

**Under 6.1.3 Plant Requirements:
STANDARD**

6.1.3 Plant Requirements:

Proof of conformance to applicable ASTM International or other industry standards shall be documented and maintained on file at the plant for all products being produced according to ASTM International or other industry standards. Annual test data (or other test data) shall be maintained at the plant for a minimum of three years.

**Under 6.2.1.2 Three-Edge Bearing Testing*:
STANDARD**

6.2.1.2 Three-Edge Bearing Testing *

For reinforced concrete pipe, verification of conformance to applicable standards (ASTM C76 and C655) shall be documented by performance of three-edge bearing testing in accordance with ASTM C497. The plant shall load the pipe up to the specified design strength D-load to produce a 0.01-inch crack. Test frequency shall be a minimum of one test per year for each size (and class) of pipe, or as described below, whichever is greater. TEB tests are not required for sizes that have less than 100 pieces manufactured during the current program year if the plant has compressive and proof of design test data on file. Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

**Under 6.2.1.3 Absorption Testing*:
STANDARD**

6.2.1.3 Absorption Testing *

Verification of conformance to the concrete absorption requirements of applicable standards shall be documented by performance of absorption testing in accordance with ASTM C497 (Test Method A or B). Absorption testing can be performed by ASTM C642 using cores only and the absorption limits of ASTM C76 shall apply. Testing shall be performed a minimum of once per year, on the mix design (both wet-cast

and dry-cast) with the lowest amount of cementitious material used at each operation or manufacturing station. Both in-plant and laboratory testing shall be permitted. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

**Under 6.2.1.8 Gasket Quality Control:
STANDARD**

6.2.1.8 Gasket Quality Control

The plant shall ensure that the rubber joint gaskets supplied with precast and pipe products are suitable for the application. This suitability shall be determined through the following:

1. Annual certification of physical properties of the rubber compound as required by the specification under which the gaskets are supplied; and
2. Measurement or certification of critical gaskets physical characteristics including (at a minimum):
 - Cross-section height and width (profile and prelubricated gaskets only)
 - Volume (ASTM C497) and diameter (o-ring gaskets only)
 - Durometer (ASTM D2240)
 - Cut length (ASTM C497)
 - Splice strength

Measurement or certification shall be accomplished by any of the following methods:

- a. The gasket supplier shall furnish documentation of the required characteristics by sampling at least 1 gasket each quarter of each size and type supplied and provide the aforementioned measurements for those gaskets; or
- b. The gasket supplier shall furnish evidence of current registration of its quality system to a recognized third-party audited standard (e.g. – ISO 9001-2000) and certify that the aforementioned measurements are recorded and maintained within this system once per year; or
- c. Using specifications and tolerances as supplied by the gasket manufacturer and the precast manufacturer, the precast manufacturer or a competent third party technical service shall perform the aforementioned measurements above by sampling at least 1 of each 300 gaskets of each size and type received and maintain records of the measurements made. (If project specifications or the authority having jurisdiction

require a frequency of testing greater than 1/300 then they shall apply.)

If any of the measurements required above indicate that the gasket is not within acceptable tolerances, additional testing shall be performed to determine if the remainder of the lot should be used. Gaskets which are not within acceptable tolerances shall be segregated from usable stock and clearly marked so as to preclude their use or transfer.

Current certification reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

Under 6.2.2.2 Three-Edge Bearing Testing*: STANDARD

6.2.2.2 Three-Edge Bearing Testing *

For reinforced concrete pipe, verification of conformance to applicable standards (ASTM C76 and C655) shall be documented by performance of three-edge bearing testing in accordance with ASTM C497. The plant shall load the pipe up to the specified design strength D-load to produce a 0.01-inch crack. Test frequency shall be a minimum of one test per year for each size (and class) of pipe, or as described below, whichever is greater. TEB tests are not required for sizes that have less than 100 pieces manufactured during the current program year if the plant has compressive and proof of design test data on file. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

Under 6.2.2.3 Absorption Testing*: STANDARD

6.2.2.3 Absorption Testing *

Verification of conformance to the concrete absorption requirements of applicable standards shall be documented by performance of absorption testing in accordance with ASTM C497 (Test Method A or B). Absorption testing can be performed by ASTM C642 using cores only and the absorption limits of ASTM C76 shall apply. Testing shall be performed a minimum of once per year, on the mix design (both wet-cast and dry-cast) with the lowest amount of cementitious material used at each operation or manufacturing station. Both in-plant and laboratory testing shall be permitted. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

**Under 6.2.2.11 Gasket Quality Control:
STANDARD**

6.2.2.11 Gasket Quality Control

The plant shall ensure that the rubber joint gaskets supplied with precast and pipe products are suitable for the application. This suitability shall be determined through the following:

1. Annual certification of physical properties of the rubber compound as required by the specification under which the gaskets are supplied; and
2. Measurement or certification of critical gaskets physical characteristics including (at a minimum):
 - Cross-section height and width (profile and prelubricated gaskets only)
 - Volume (ASTM C497) and diameter (o-ring gaskets only)
 - Durometer (ASTM D2240)
 - Cut length (ASTM C497)
 - Splice strength

Measurement or certification shall be accomplished by any of the following methods:

- a. The gasket supplier shall furnish documentation of the required characteristics by sampling at least 1 gasket each quarter of each size and type supplied and provide the aforementioned measurements for those gaskets; or
- b. The gasket supplier shall furnish evidence of current registration of its quality system to a recognized third-party audited standard (e.g. – ISO 9001-2000) and certify that the aforementioned measurements are recorded and maintained within this system once per year; or
- c. Using specifications and tolerances as supplied by the gasket manufacturer and the precast manufacturer, the precast manufacturer or a competent third party technical service shall perform the aforementioned measurements above by sampling at least 1 of each 300 gaskets of each size and type received and maintain records of the measurements made. (If project specifications or the authority having jurisdiction require a frequency of testing greater than 1/300 then they shall apply.)

If any of the measurements required above indicate that the gasket is not within acceptable tolerances, additional testing shall be performed to determine if the remainder of the lot

should be used. Gaskets which are not within acceptable tolerances shall be segregated from usable stock and clearly marked so as to preclude their use or transfer.

Current certification reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

COMMENTARY

Under 6.3.2 Flat Slab Tops:

STANDARD

Verify the design for each size flat slab top produced or stocked by the plant, either by maintaining rational design calculations or by proof testing, as outlined in the applicable section(s) of ASTM C497. The design shall meet the minimum requirements of ASTM C478.

Design calculations shall be performed and stamped by a qualified, licensed engineer. Proof testing (when performed) shall also be reviewed and signed off by a qualified, licensed engineer.

Design calculations should be performed and stamped by a qualified, licensed engineer. Proof testing (when performed) should also be reviewed by a qualified, licensed engineer.

Note: The minimum reinforcing steel requirements for flat slab tops outlined in ASTM C478 represent the absolute minimum steel that should be used in flat tops. Additional reinforcement and/or slab thickness may be required to adequately support the design loads.

Under 6.3.3.1 Absorption Testing: STANDARD

6.3.3.1 Absorption Testing *

Verification of conformance to the concrete absorption requirements of ASTM C478 shall be documented by performance of absorption testing in accordance with ASTM C497 (Test Method A or B). Absorption testing can be performed by ASTM C642 using cores only and the absorption limits of ASTM C478 shall apply. Testing shall be performed a minimum of once per year, on the mix design (both wet-cast and dry-cast) with the lowest amount of cementitious material used at each operation or manufacturing station. Both in-plant

and laboratory testing shall be permitted. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

**Under 6.3.3.2 Step Testing:
STANDARD**

6.3.3.2 Step Testing

Step vertical and horizontal load testing must be performed according to the applicable section(s) of ASTM C497 once per year, per step design used and whenever a new step supplier is used. The step testing must be performed in the precast plant in the product for its intended use. The testing must be performed or witnessed and results documented by a member of the precasters Quality Control Department. The loads achieved must meet the requirements of ASTM C478. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

**Under 6.3.5 Gasket Quality Control:
STANDARD**

6.3.5 Gasket Quality Control

The plant shall ensure that the rubber joint gaskets supplied with precast and pipe products are suitable for the application. This suitability shall be determined through the following:

1. Annual certification of physical properties of the rubber compound as required by the specification under which the gaskets are supplied; and
2. Measurement or certification of critical gaskets physical characteristics including (at a minimum):
 - Cross-section height and width (profile and prelubricated gaskets only)
 - Volume (ASTM C497) and diameter (o-ring gaskets only)
 - Durometer (ASTM D2240)
 - Cut length (ASTM C497)
 - Splice strength

Measurement or certification shall be accomplished by any of the following methods:

- a. The gasket supplier shall furnish documentation of the required characteristics by sampling at least 1 gasket each quarter of each size and type supplied

and provide the aforementioned measurements for those gaskets; or

- b. The gasket supplier shall furnish evidence of current registration of its quality system to a recognized third-party audited standard (e.g. – ISO 9001-2000) and certify that the aforementioned measurements are recorded and maintained within this system once per year; or
- c. Using specifications and tolerances as supplied by the gasket manufacturer and the precast manufacturer, the precast manufacturer or a competent third party technical service shall perform the aforementioned measurements by sampling at least 1 of each 300 gaskets of each size and type received and maintain records of the measurements made.

If any of the measurements required above indicate that the gasket is not within acceptable tolerances, additional testing shall be performed to determine if the remainder of the lot should be used. Gaskets which are not within acceptable tolerances shall be segregated from usable stock and clearly marked so as to preclude their use or transfer.

Current certification reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

Under 6.4.1 Absorption Testing: STANDARD

Absorption testing shall be performed and documented in accordance with ASTM C497 (Test Method A or B). Absorption testing can be performed by ASTM C642 using cores only and the absorption limits of ASTM C76 or C478 shall apply. Testing shall be performed a minimum of once per year, on the mix design with the lowest amount of cementitious material at each operation or manufacturing station. Both in-plant and laboratory testing shall be permitted. **Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.**

Under 6.5.1 Structural Proof of Design:

STANDARD

6.5.1 Structural Proof-of-Design

Structural proof-of-design shall be demonstrated either by calculation or by proof testing.

COMMENTARY

Proof-of-design should be demonstrated for the maximum design burial

Design calculations shall be performed and stamped by a qualified, licensed engineer. Proof testing in lieu of design calculations shall be reviewed and signed-off by a qualified, licensed engineer.

depth, accounting for the local surface, soil and hydrostatic loading conditions.

~~Design calculations should be performed and stamped by a qualified, licensed engineer. Proof testing (when performed) should also be reviewed and signed-off by a qualified, licensed engineer.~~

Under 6.5.2 Watertightness Testing *: STANDARD

COMMENTARY

6.5.2 Watertightness Testing *

Tank watertightness shall be demonstrated according to the applicable section(s) of ASTM C1227, ASTM C1719, IAPMO/ANSI Z1000, or the requirements set forth by the authority having jurisdiction, whichever is more stringent. A minimum of one test per year on a septic tank produced in each septic tank form used at the plant shall be performed and documented. If the authority having jurisdiction require a greater frequency of testing, the plant shall maintain records of all additional tests at the plant.

** Critical Requirement – plants participating in the NPCA Plant Certification Program must receive a minimum passing grade, as shown on the grading schedule, for section 6.5.2 and others designated as Critical Requirements, when applicable.*

Watertightness testing may be performed and documented at the plant and shall be witnessed and signed off by the plant QC Manager.

Watertightness testing of a tank produced in each form is necessary to ensure that all forming equipment remains within appropriate tolerances.

Watertightness testing may be conducted in the field prior to backfill and shall be witnessed and signed off by the authority having jurisdiction.

Forms, whose castings have been tested and meet the requirements, may be used to produce septic tanks or grease interceptors without additional testing.

In cases when multiple tank sizes are manufactured using the same form, watertightness testing shall be performed on the largest (tallest) structure, as long as the same concrete mix design is used. ~~Otherwise, testing shall be performed on each individual tank design.~~

~~For individual tanks models manufactured using panel type forms, a single tank of each model shall be tested per year.~~

As an example: plants manufacturing 1,000, 1,500, and 2,000 gallon tank models with panel forms, only a single tank model per year would

require watertightness testing.

In cases where tanks are physically too large to assemble, water test and disassemble at the plant without damage, or in areas where the Authority Having Jurisdiction has no requirements for watertightness testing; watertightness testing requirement is waived.

Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

On page 105 under 6.6.1 Structural Proof of Design:

STANDARD

COMMENTARY

6.6.1 Structural Proof-of-Design

Structural proof-of-design shall be demonstrated either by calculation or by proof testing.

Proof-of-design should be demonstrated for the maximum design burial depth, accounting for the local surface, soil and hydrostatic loading conditions.

Design calculations shall be performed and stamped by a qualified, licensed engineer. Proof testing in lieu of design calculations shall be reviewed and signed-off by a qualified, licensed engineer.

~~Design calculations should be performed and stamped by a qualified, licensed engineer. Proof testing (when performed) should also be reviewed and signed-off by a qualified, licensed engineer.~~

Under 6.6.2 Watertightness Testing *:

STANDARD

COMMENTARY

6.5.2 Watertightness Testing *

Tank watertightness shall be demonstrated according to the applicable section(s) of ASTM C11613, ASTM C1719, IAPMO/ANSI Z1001, or the requirements set forth by the authority having jurisdiction, whichever is more stringent. A minimum of one test per year on a septic tank produced in each septic tank form used at the plant shall be performed and documented. If the authority having jurisdiction require a greater frequency of testing, the plant shall maintain records of all additional tests at the plant.

** Critical Requirement – plants participating in the NPCA Plant Certification Program must receive a minimum passing grade, as shown on the grading schedule, for section 6.5.2 and others designated as Critical Requirements, when applicable.*

Watertightness testing may be performed and documented at the plant and shall be witnessed and signed off by the plant QC Manager.

Watertightness testing may be conducted in the field prior to backfill and shall be witnessed and signed off by the authority having jurisdiction.

In cases when multiple tank sizes are manufactured using the same form, watertightness testing shall be performed on the largest (tallest) structure, as long as the same concrete mix design is used. **Otherwise, testing shall be performed on each individual tank design.**

For individual tanks models manufactured using panel type forms, a single tank of each model shall be tested per year.

In cases where tanks are physically too large to assemble, water test and disassemble at the plant without damage, or in areas where the Authority Having Jurisdiction has no requirements for watertightness testing; watertightness testing requirement is waived.

Current test reports shall be dated not more than one year at the end of the month from the date of the last test or certification.

Watertightness testing of a tank produced in each form is necessary to ensure that all forming equipment remains within appropriate tolerances.

Forms, whose castings have been tested and meet the requirements, may be used to produce grease interceptors or septic tanks without additional testing.

As an example: plants manufacturing 1,000, 1,500, and 2,000 gallon tank models with panel forms, only a single tank model per year would require watertightness testing.

Under Appendix A:

The list of ASTM Standards has been updated as necessary. See the actual manual test for any changes or additions.

Under Appendix B:

An example Self-Audit report has been added.

Under Plant Terms and Conditions:

PLANT TERMS AND CONDITIONS

NPCA PLANT CERTIFICATION **and OPTIONAL PRODUCT LISTING FOR WATER and WASTEWATER TANKS**

PART 1

PURPOSE, SCOPE, **SUBMITTALS** AND AUDITS

1.1 Purpose

1.1.1 To assure a uniformly high degree of excellence in plant facilities, production, procedures, and quality control operations.

- 1.1.2 To assist management in achieving excellence in plants and operations.
- 1.1.3 To provide recognition for plants which achieve a high degree of excellence.
- 1.1.4 To assist users and specifiers of precast identify and select high quality precast concrete manufacturers.

1.2 Scope

1.2.1 The Plant Certification Programs outlined herein are directed at certifying that plant processes are in place to produce precast concrete products with a high degree of excellence.

1.2.2 The NPCA Certification programs certify the precast plants processes.

1.2.3 The NPCA Product Listing program certifies that water and wastewater tanks meet the requirements of applicable industry standards.

1.2.4 Plants making application for product listing must be an NPCA plant is good standing and hold a current NPCA Plant Certification.

1.3 Submittal

1.3.1 The submittal consists of a complete document package that includes detailed and stamped structural engineering design calculations for the precast concrete water or wastewater tank and a complete set of details illustrating compliance with all sections of the applicable industry standard (ASTM C913, IAPMO/ANSI Z1002, or ASTM C1227, IAPMO/ANSI Z1000 or ASTM C1613, IAPMO/ANSI Z1001).

1.4 Plant Inspections

1.4.1 A plant qualifies as an NPCA Certified Plant if it meets or exceeds the required level of excellence during the initial announced inspection and subsequent annual unannounced inspections. Plants shall remain certified if all necessary fees are paid and the plant attains the minimum score on each annual audit.

PART 2

ADMINISTRATION OF NPCA PLANT CERTIFICATION and OPTIONAL PRODUCT LISTING FOR WATER and WASTEWATER TANKS

2.1 Administrators

The administrators of the programs will be members of the NPCA staff. The duties of the administrators include but are not limited to:

2.1.1 Members of the NPCA Technical Staff, Certification & Technical Services Administrator, Technical Services Engineer, Director of Quality Assurance Programs are responsible for implement the policies and directives issued by the NPCA Quality Assurance Committee, which oversees the NPCA Plant Certification.

2.1.2 Members of the NPCA Technical Staff, Technical Services Engineers & Director of Quality Assurance Programs are responsible for the review and approval of plant submittal packages to the program.

2.1.3 Maintain the files generated by the programs.

2.1.4 Maintain and distribute current lists of NPCA Certified Plants

2.1.5 Coordinate scheduling of audits with plants and audit agency.

2.1.6 Serve as treasurer for the programs by initiating invoices to plants, approving bills for expenses attributable to the programs, maintaining a system for collection of receivables, and reporting periodically on the financial status of the programs to the NPCA Quality Assurance Committee.

2.1.7 Issue certificates or plaques to each plant that qualifies as an NPCA Certified Plant.

2.1.8 Issue certificates to each plant for products (s) that meet the requirements of the NPCA Product Listing.

2.2 NPCA Quality Assurance Committee

Duties of NPCA Quality Assurance Committee include but are not limited to:

2.2.1 Establish policies relating to the requirements of the programs.

2.2.2 Give direction to the administrators of the programs.

2.2.3 Give direction in the selection of plant inspection agency or agencies.

2.2.4 Oversee the programs content, including direction on plant inspections and administration of the programs.

2.2.5 Promote the programs to the NPCA members.

2.2.6 Publicize the programs to buyers of precast concrete products.

2.2.7 Oversee revisions of the NPCA Quality Control Manual for Precast Concrete Plants and other related publications.

2.2.8 Oversee revisions of the programs, including the grading schedule.

2.2.9 Serve as an Appeals Board (see Part 6).

2.3 Inspection Agency

The NPCA Quality Assurance Committee will select an inspection agency or agencies that have personnel who are trained, qualified and knowledgeable about the operations of precast concrete manufacturing plants and production of quality precast concrete products. They also must have experience in quality control operations and be able to audit plants with minimal advance notice.

Auditors shall have an engineering degree (preferably civil or structural engineering), unless otherwise approved by NPCA, and shall have attended NPCA auditor training and shall have been appropriately trained by NPCA and the agency and shall have gained experience necessary through shadowing other auditors in field activities to critically assess the manufacturing process and production of precast concrete. The auditor shall display knowledge, experience, integrity, ability and good professional judgment. The auditor shall be thoroughly familiar with the NPCA QC Manual and all other pertinent technical publications of NPCA, ACI, ASTM International, and other industry standards. The auditor shall have sufficient skill in dealing with other persons to earn their respect, and to deal with them courteously while maintaining the requisite professional distance. The third party agency shall promptly accede to any request by NPCA that an auditor be replaced in view of a lack of any of these qualities. All audits shall be performed under the supervision and reviewed by a Professional Engineer. NPCA Auditors will provide their official credentials upon meeting with the plant liaison on the day of the plant audit. All third party agency auditors shall abide by the NPCA confidentiality and conflict of interest agreement and shall conduct themselves in a professional and impartial manner.

Before performing any NPCA plant audits, the agency and its personnel must become familiar with both the NPCA Quality Control Manual for Precast Concrete Plants and the programs. The agency must also develop a quality assurance program, which will ensure that all audits are made in a uniform manner and that a uniform grading system is used.

The agency will perform the audits as detailed in the applicable agency specific contract documents and Part 3 and Part 7.

The NPCA Quality Assurance Committee may select more than one audit agency, in which case all of the above items are applicable to each agency, including uniformity of inspections and grading, confidentiality, conflict of interest and impartiality.

Third party agency auditors shall not be eligible to perform plant audits during the program year without attending NPCA auditor training and / or as authorized by NPCA.

Third party agencies shall hold a current accreditation to ISO/IEC 17020.

2.4 Recording Keeping

The Administrators will maintain all pertinent records of the programs. These records include but are not limited to:

2.4.1 Pertinent correspondence

2.4.2 Meeting minutes of the NPCA Quality Assurance Committee

2.4.3 Program Contracts

2.4.4 Plant certificates

2.4.5 Completed audit reports, and grading schedules, and plant corrective action responses.

- 2.4.6 Standardized grading schedules
- 2.4.7 Correspondence dealing with appeals
- 2.4.8 Current list of certified plants and products.

2.5 Continuous Improvement

Satisfaction of continuous improvement requirements will be based solely on the plant providing objective evidence to the auditor that activities are in place and/or have taken place at the plant. NPCA plant auditors will be required to visit the NPCA Producer Portal and view plant documentation online prior to their inspection of the plant. This initial evaluation of plant records shall include those activities pointed at continuous improvement activities engaged by the plant.

In order for plants to be considered for continuous improvement points they must participate in two of the following:

- (1) The plant shall upload documents to the Certified Producer Portal and earn 1% to be added to the plant final score for completing the following items;
 - a. The plant shall update their plant profile sheet annually;
 - b. The plant shall download their renewal certificate annually;
 - c. The plant shall download their final inspection report and certificate annually (hard copies can be made available upon request);
 - d. At a minimum, the plant shall upload annual certification records for raw materials, annual calibration of equipment, current ACI certifications and current PQS certifications for quality personnel;
 - e. Plants producing stormwater and/or sanitary concrete pipe shall upload current annual absorption test data;
 - f. Plants producing round manhole products shall upload current annual absorption test data;
 - g. Plants producing septic tanks shall upload current annual watertightness test data for all models produced;
 - h. Plants producing grease interceptors shall upload current annual watertightness test data for all models produced.
- (2) The plant shall perform and generate final reports for semi-annual self-audits using the Self-Audit tool within the Producer Portal. The plant shall earn 1% to be added to the plant final score for completion of semi-annual self-audits;
- (3) The plant shall complete education requirements and uploads equivalent to 1 hour of education for each plant employee annually. The plant shall earn 1% to be added to the plant final score for completion of the following;
 - a. Plant Quality Personnel – certificate upload for NPCA PQS training beyond current minimum specified in section 1.1.3 of the NPCA QC Manual, PQS Level II QA/QC-Technical, PQS Level II-Production (including a current Master Precaster certification in year one followed by 4 hours of continuing industry-related education in year two). Industry related education uploaded information shall include learning objectives, course description and certificate of completion.

- b. Non-Quality Plant Personnel – Any NPCA course offering applies. Industry-related education uploaded information shall include learning objectives, course description and certificate of completion.

The plant is eligible to earn up to an additional 6% added to the plant final score for continuous improvement efforts in the four categories of Section 1.1.4 of this manual. Satisfactory activity in these four categories shall be evaluated by active participation and objective evidence provided by the plant to the designated third party auditor during the plants annual unannounced plant inspection.

Plants earning probationary status or failing it's annual inspection are not eligible for continuous improvement added values.

PART 3

Plant Audits

3.1 Scheduling

The Administrators will help coordinate initial audit between the plant and the agency, so that the audit is made at a mutually convenient time. Subsequent unannounced audits shall be released by NPCA to the agency each year and scheduled by the agency and be performed at least once per calendar year, or as directed by NPCA. Annual program fees shall be due on or before January 1st of each calendar year.

3.1.1 Plants must receive their annual audit within 16 calendar months of their previous audit or may be subject to decertification.

3.2 Plant Liaison Representative

Plant management will assign one person to serve as a liaison representative during the audit. The plant liaison representative will be available to assist in the audit by making quality control records, calibration records, drawings, etc., available for review by the auditor. The Plant Liaison will also be available to accompany the auditor throughout most of the operations in order to utilize the auditor's time most efficiently.

3.3 Duties of the Auditor and Agency Personnel

3.3.1 The auditor will arrive at the plant prepared to begin the inspection.

3.3.2 The auditor will not depend upon the plant for transportation to or from the plant nor for meals or lodging during the audit.

3.3.3 The auditor will abide by all safety regulations of the plant.

3.3.4 The auditor will neither impede nor delay any of the plant's operations.

3.3.5 The auditor may videotape parts of the audit or take photographs, but only if permitted to do so by plant management.

- 3.3.6 The auditor will observe and grade those items for which points are assigned on the grading schedule. Using the plants internet connection or a connection in the vicinity of the facility, the auditor will generate a preliminary report using the NPCAAuditor proprietary software program. Items that are not applicable will be so marked.
- 3.3.7 The auditor shall conduct a close-out interview. Plants shall receive a copy of their preliminary report and grading schedule and all observed deficiencies during the close-out interview. See section 7.2.7 for responsibilities of the plant.
- 3.3.8 At the conclusion of the close-out interview, the auditor and a plant representative present will sign and date the close-out interview documents, such as, but not limited to, the preliminary report and grading schedule and / or the close-out interview form provided by the auditor and these documents will become part of the permanent record of the inspection.
- 3.3.9 If for some reason the plant does not agree with the audit scoring or there are specific circumstances that cannot be agreed upon at the conclusion of the close-out interview; the plant representative should not sign the close-out form. This action will start the appeals process (see Section 6).
- 3.4.0 Auditors shall maintain the highest level of integrity and professionalism. Inspection agency employees and inspection personnel shall abide by the NPCA confidentiality and conflict of interest policies currently in force. Agency personnel shall exhibit impartiality during inspections proceedings and when representing the NPCA Plant Certification programs. Activities of inspection shall not be marketed in such a manner as to compromise the impartiality of the NPCA certification program.

PART 4

GRADING SCHEDULES

- 4.1 The grading schedules are shown in the section titled "Grading Schedule" in the NPCA Quality Control Manual for Precast Concrete Plants. It can be seen that the items listed specifically refer to sections of the NPCA Quality Control Manual for Precast Concrete Plants.
- 4.2 Sections to be graded have been assigned "points" (A) shown in the first column on the right. The auditor grades each section based on the percentage of compliance with the Quality Control Manual shown in the second column (B). Certain items may not be applicable (NA) to all plants during an inspection. Those items are not graded. For each graded item the number of points (A) is multiplied by the grade percentage (B). The sum of those values is obtained for each chapter. Because some items are not applicable, an adjustment is made.
- 4.3 The grade adjustment consists of multiplying the sum of $A \times (B/100)$ for each chapter by 100 and dividing by the total possible points that are applicable and/or observable. The final plant score represents the percentage of total points earned by the plant versus the total applicable and/or observable points.

- 4.4 Completed grade sheets are sent to the plant representative, and a copy is kept on file by the Administrator. No other copies are distributed unless the applicable plant provides consent or instruction to do so in writing to the program Administrators.
- 4.5 Critical sections of the manual are graded with the actual scoring percentage earned by the plant for each specific element and totaled. Plants scoring less than 75% in any critical section will be awarded zero '0' points for that element. New plants scoring less than 75% in any critical section during their initial announced plant inspection will not be considered for certification. Existing plants scoring less than 75% in any critical section or an overall plant score of less than 80% but greater than or equal to 75% during their annual unannounced plant inspection will be subject to probationary status (See part 5.2.1 Probationary Status).

PART 5

GRADING, CERTIFICATION STATUS, and CORRECTIVE ACTIONS

5.1 Certified Status

5.1.1 A plant qualifies as a certified plant if it achieves a plant score of 75% or greater in each applicable Critical Requirement section of the pertinent grading schedule and achieves an overall score of 80% or greater.

5.1.2 A plant fails its audit if it achieves an overall score less than 75%.

5.1.3 A plant qualifies for NPCA product listing if it provides a complete and NPCA approved document submittal and passes its initial or annual unannounced audit.

5.1.4 A plant is not eligible for product listing if it earns probationary status or fails its annual unannounced audit.

5.1.5 Plants earning probationary status or failing its annual unannounced audit will lose listing status and must reapply to the program.

5.2 Probationary Status

5.2.1 A plant that does not comply with the conditions set forth in section 5.4.1; Corrective Action response, achieves a score of less than 75% for any critical requirement or achieves an overall plant score greater than or equal to 75% and less than 80% is eligible to receive probationary certification status.

5.2.2 Probationary Certification status shall remain in effect until such time when the plant is re-audited and for a period not to exceed 90 calendar days from the previous audit and the conditions calling for probationary status no longer exist, as determined by the audit agency and/or NPCA or its agent. Plants failing to pay the applicable fee and receive a re-audit of the plant will not be considered for certification.

5.2.3 In no way will the plant listing on the NPCA Web site or anywhere else indicate that a plant has received probationary certification.

5.2.4 The plant must pass their unannounced re-audit and receive an overall score of 80% or greater and must score at least 75% on all Critical Requirements in order to be removed from probationary status.

5.2.5 Plants that fail their unannounced re-audit will be required to reapply to the program.

5.3 Provisional Status

5.3.1 The Provisional Certification period is effective when a plant that is currently certified in the program, fails an unannounced audit, and appeals the results of the audit. This period is intended to allow sufficient time for a plant to appeal the results of the failed audit, while maintaining certified status. The Provisional Certification period is as follows:

5.3.1.1 A plant that appeals the results of the audit and the appeal is approved, the Provisional Certification period ends on the date of the approved appeal. Thereafter, the plant resumes normal certified status.

5.3.1.2 For plants that appeal the results of the audit and the appeal is denied, the Provisional Certification period ends on the date of the denied appeal and the plant is no longer certified. To re-enter the certification program, the plant must reapply, pay certification fees and successfully pass its unannounced audit.

5.3.1.3 Plants that do not appeal the results of a failed audit are not eligible for Provisional Certification. See section 6.2 for appeal deadline.

5.4 Corrective Actions

5.4.1 All plants passing their audit (regardless of score) must respond in writing indicating corrective action taken, or the justification for not taking corrective action to all deficiencies noted in their report. All plants failing to submit a written response with documented evidence within 45 days of the plant audit will receive probationary status and be subject to the conditions set forth in section 5.2.1; Probationary Status.

Documented evidence shall be supplied (photographs, completed inspection forms, test results, copies of material certifications) to illustrate compliance to requirements and of the corrective action taken to both NPCA and the agency.

PART 6

APPEAL PROCEDURE

6.1 If plant management disagrees with the grade resulting from a plant audit, the approval of a product submittal or decision on product listing, management may file an appeal for review by the NPCA Quality Assurance Review Subcommittee, or their designees. See section 5.3 for information regarding Provisional Plant Certification during the appeals process. Provisional Plant Certification does not pertain to NPCA Product Listing.

6.2 The complete appeal shall be in the form of a letter or email addressed and sent to the program Administrator. A plant must appeal an audit within 45 calendar days of the plant audit. A copy of the Preliminary or Final Report grading schedule shall accompany the letter or email. Individual grades on specific sections with which management disagrees shall be circled and all supporting documentation (photographs, completed inspection forms, test results, copies of material and certification to illustrate compliance to requirements) shall be provided along with reasons why management believes each circled grade should be changed. If the plant fails to provide a written appeal and all relevant documentation the appeal will be denied.

Plants wishing to file a formal appeal of their audit must do so within 45 calendar days of the plant audit. The complete appeal shall be received in the form of a letter or an email along with all supporting documentation addressed and sent to the program Administrator. Supporting documentation shall include items such as, but not limited to, a copy of the preliminary or final report grading schedule, photographs, completed inspection form, test results, and copies of material to illustrate compliance to requirements along with corrective action responses to all deficiencies noted in the inspection report. The plant representative shall also supply reasons they believe a scoring appeal is warranted.

6.3 If necessary the Review Subcommittee shall request a response from the inspection agency. The agency will respond briefly in writing to the Administrator within 21 calendar days of receipt of notice of appeal by the Administrator.

6.3.1 If the agency agrees with the appeal and agrees that the grade should be changed as requested in the appeal, the agency will prepare a revised report and grading schedule.

6.3.2 If the inspection agency disagrees with the appeal and believes that the grades originally assigned are appropriate and the plant wishes to have the appeal heard by the Quality Assurance Review Subcommittee (which acts as the appeals board), the chairperson (or designated program administrator) of the NPCA Quality Assurance Committee will poll the Review Subcommittee members to determine if they (a) agree with the appeal and disagree with the agency's response, or (b) disagree with the appeal and agree with the agency's response. The chairperson (or designated program administrator) shall poll the members to determine if a hearing of the appeal is needed and if so, to establish a date for the hearing. Subcommittee members who have a conflict of interest with regard to the plant in question must remove themselves from the polling.

6.4 The Director of Quality Assurance Programs will review all product listing related situations and notify the NPCA Quality Assurance Review Subcommittee of any action needed.

6.5 Hearings for appeals will usually be scheduled to coincide with the regularly scheduled monthly meetings of the NPCA Quality Assurance Review Subcommittee, but hearings may be held at other times which are mutually convenient for the Review Subcommittee, management of the plant which filed the appeal, and the inspection agency and may consist of a conference call.

6.6 Hearings for appeals will be closed meetings with only the Quality Assurance Review Subcommittee, the Administrators, management of the appealing plant, and if required the agency

representative. The management of the plant which filed the appeal will first present its case orally and the committee may ask questions of the speaker. The agency representative will then orally present its case followed by answering questions raised by the committee. Management of the appealing plant then will make its closing statement and that will be followed by the closing statement of the agency representative. Representatives of the appealing plant and the agency will then be excused so that the Subcommittee can deliberate in executive session.

6.7 If a member of the Quality Assurance Review Subcommittee is a representative of the appealing plant, or it is determined that they have a conflict of interest, that Subcommittee member shall excuse themselves from the deliberations in executive session.

6.8 Decisions of the Quality Assurance Review Subcommittee will be sent to both the plant management and the agency within ten calendar days of the hearing. The Quality Assurance Review Subcommittee's decision(s) will be final and no further appeals will be considered.

PART 7

7.1 Applicable Plant

The NPCA Plant Certification Program Contracts **and Product Listing Application** apply only to the plant described in the Plant Profile Information supplied by the plant. However, in cases where a plant operates two production facilities at separate physical locations and they are within a 20-mile driving distance of each other, the plant may elect to include both of these production operations under one contract and be inspected during the same audit visit. A single report will be issued by the agency for both production locations. This means that the success of either plant is dependent on the other plant – if one fails, they both fail. In addition, in such instances, it may be necessary for the program fee to be increased, because the production operations are too large and/or too complex to adequately audit during a normal-length (one-day) period and an additional audit day shall be required. Such instances will be judged on a case-by-case basis jointly by the agency and NPCA. In all other cases, each production operation must use separate NPCA contracts for each production operation, if so desired. **Multiple physical plant location option does not apply to NPCA Product Listing.**

7.2 Audits and Certification

7.2.1 Audits will be conducted by an approved, accredited, and independent audit agency or agencies appointed by NPCA. NPCA retains sole authority in the appointment of one or more audit agencies. Certification of the plant shall be established on the basis of the plant's satisfactory performance during these audits, as described in the Program and the QC Manual, which are incorporated herein by reference.

7.2.2 Scheduling of first time, announced (initial) and subsequent unannounced annual audit shall be at the sole discretion of the audit agency once released by NPCA. However, the audit agency shall contact the plant in an effort to determine a date for the first time, announced audit that is mutually agreeable.

- 7.2.3 The plant must agree to schedule the first-time, announced audit within three-months (90 days) of signing the program Contract; otherwise the plant agrees to forfeit the entire certification fee.
- 7.2.4 First time (initial) plant audits will be announced to the plant in advance. Advance notice will typically be approximately two (2) to four (4) weeks. For the plant's initial audit, the plant shall have records required by the program for a minimum of thirty (30) calendar days of production immediately prior to the audit date.
- 7.2.5 Subsequent annual audits will be unannounced.
- 7.2.6 Inspections, grading and certification shall be conducted as described in the program.
- 7.2.7 The plant agrees to cooperate fully with the audit agency and its employees. The plant shall allow the auditor access to the facilities internet connection and printer for generating the close-out interview documents.
- 7.2.7.1 The plant agrees to cooperate fully in the situation that the audit agency is being audited by NPCA while performing a plant audit.
- 7.2.7.2 The plant agrees to cooperate fully in the situation that the audit agency auditor is being audited by NPCA who is being audited by the ANSI auditor when performing a plant audit.
- 7.2.7.3 The plant agrees to comply fully with the program contract document.
- 7.2.8 In Non-English speaking locations, the plant agrees to provide an English-speaking liaison to the auditor to interpret communications between the auditor and plant representatives.
- 7.2.9 Immediately following the audit, the auditor will hold a closeout interview and be available for discussion and questions about the inspection with plant representative and/or management.
- 7.2.10 The audit agency will audit the plant for the sole purpose of assessing the plant's compliance with the standards outlined in the most current edition of the NPCA QC Manual, unless otherwise directed by NPCA. NPCA reserves the right, at its sole discretion, to periodically update and modify the QC Manual.
- 7.2.11 No audit or observation will be made of safety, environmental or other conditions, and NPCA and the audit agency disclaims responsibility to the plant and any third party for such conditions.
- 7.2.12 The programs do not certify products, or the company as a whole. The programs instead confirm the capability of the audited plant, in which products are produced to meet the minimum requirements of the Program. This confirmation includes, but is not limited to; the plant's manufacturing processes, production procedures and quality control operations.

- 7.2.13 Active production operations must be observed by a representative of the audit agency during all inspections. When awaiting an unannounced audit, the plant shall provide accurate production schedule information to NPCA. This information is then used by the inspection agency to schedule unannounced inspections appropriately.
- 7.2.13.1 The plant shall notify NPCA in writing of dates when production will not take place as far in advance as possible, but not later than 14 calendar days prior to any date in which production operations will not take place during normal production days. For the purposes of the program Contract, normal production days are defined as Monday through Friday.
- 7.2.13.2 Plants will be charged for the audit agency's time and expenses if they fail to notify NPCA in writing of a date in which production operations did not occur AND the audit agency attempts to perform an unannounced audit at the plant on that date, but is unable to do so because of a lack of observable production operations. This fee is payable and subject to the provisions set forth in the applicable Program Fee Schedule.
- 7.2.13.3 Instances of unforeseen production stoppage caused by conditions beyond the plant's control (such as inclement weather, unexpected equipment breakdown, third-party raw material delivery delays, etc.) shall NOT be cause for this extra charge. However, the plant shall practice due diligence and notify NPCA in writing when such unforeseen production stoppages occur. If it is deemed that the plant did not put forth a good faith effort to notify NPCA, the plant will be charged for the audit agency's time and expenses associated with the attempted audit.
- 7.2.13.4 Plants refusing an unannounced audit for reasons other than those stated in Subsection 7.2.13.3 above constitute grounds for the plant to be decertified.
- 7.2.13.5 The NPCA Quality Assurance Review Subcommittee will resolve any disputes that may arise regarding interpretation of this section of the contract. The decision of the NPCA Quality Assurance Review Subcommittee will be final.
- 7.2.14 In the process of promoting the NPCA Plant Certification **and/or Product Listing Programs** to various specifying agencies, from time to time, representatives from these agencies may request to observe an actual inspection. The plant agrees to cooperate fully in good faith with this process and, in case of such a request from a specifying agency representative, the plant agrees to allow the representative to observe an audit at their facility, whether or not the audit is announced or unannounced.

7.2.15 The plant must notify NPCA, in writing, of any materially changed condition, as defined in the following, within 30 calendar days of the change. Failure to do so may result in decertification.

7.2.15.1 Change in plant ownership.

7.2.15.2 Change in the type or capability of operations, equipment or facilities, or the physical location of the facility in relation to the requirements of the program. If the reported change is judged jointly by the NPCA Quality Assurance Committee, NPCA and the Audit Agency to substantially affect or influence the plant's capabilities of adhering to the requirements of the program, the plant shall receive an additional, unannounced audit. The cost of such an audit shall be borne by the plant in the amount of the standard program fee.

PART 8

8.0 Additional Random Unannounced Audits

8.0.1 The frequency of unannounced additional random unannounced audits shall be determined by the NPCA Quality Assurance Committee, and/or NPCA, at its sole discretion.

8.0.2 If NPCA receives written evidence from a credible authority that asserts that a certified plant is not in substantial compliance with the requirements of the applicable program, the NPCA Quality Assurance Committee, NPCA and the Inspection Agency, jointly and at their sole discretion, shall determine if there is sufficient cause to conduct an unannounced re-audit at the plant. The cost of such an audit shall be borne by the plant.

8.0.3 Should a plant fail an audit, the plant must follow the procedures set forth in Section 5.3.

8.1 Confidentiality

8.1.1 Except as required by legal order or otherwise required by law, neither NPCA nor the audit agency nor any of their employees shall reveal any specific data or grading with respect to the plant audited, other than to the plant's authorized representative, except with the plant's written consent.

8.1.2 Specifying agencies may, on occasion, request copies of certification reports and/or grading information for review. NPCA will not provide this information, unless specifically directed to do so in writing from the plant. An individual plant may elect, at its own discretion, to provide this information directly to a specifying agency to satisfy such a request.

8.2 Plant Certification

The NPCA Plant Certification is envisioned to be **the** foremost management tool for precast concrete manufacturing. The certification process furnishes a framework for management

decisions in making changes in equipment and procedures to create a quality manufacturing environment. Upon Certification:

- 8.2.1 The plant shall receive a Certification Plaque, supplied by NPCA. For plants that choose to certify two production locations under the provisions of the program Contract, each location shall receive a separate plaque, noting the location or each.
- 8.2.2 NPCA will grant the plant the right to use, in conformance with the program guidelines and contract, the appropriate Certification seal, emblem, logo, etc. (Symbol) for use on stationery and for advertising purposes for as long as the plant's Certification is in effect and provided such use is only in reference to the plant covered by the program contract, and not the company as a whole nor any other non-certified branch locations. Additionally, the plant may only place NPCA Plant Certification Symbol or any other reference to the program on products produced at the plant location(s) covered under the NPCA Plant Certification Program Contract.
- 8.2.3 Certified plants are registered with NPCA and are added to the NPCA published list of certified precast concrete plants. This listing is included in the NPCA Annual Membership Directory and on the NPCA Web site. In cases where two production locations are covered by this contract, both shall be listed separately.
- 8.2.4 It is understood that in issuing a certification plaque and Symbol, and authorizing its use, NPCA does not approve, endorse or guarantee any inspection, product, system or construction, or in any way make any expressed or implied warranties in connection with any inspection, product, system or construction.
- 8.2.5 The certification plaque and Symbol remain the property of NPCA and must be surrendered by the plant immediately in the event of expiration, decertification, termination of this contract, or withdrawal from the program, and any use of NPCA Plant Certification Program literature, advertising, or stationery or any other materials referencing the program must immediately cease.
- 8.2.6 In the event that NPCA becomes aware of evidence that the Certification seal, emblem, logo, or other symbol of or reference to certification is being used by an unauthorized person or organization, NPCA shall ask its General Counsel to assess whether the evidence is sufficient to issue a letter instructing the misappropriating person to cease and desist from the misappropriation. If the evidence is deemed sufficient, the General Counsel shall issue a letter to the misappropriating person or organization based upon whether the misappropriating person is an applicant or member of the Certification Program, or not involved in the program.

If the evidence is not deemed sufficient for a "cease and desist" letter, the President may issue a letter to the misappropriating person expressing NPCA's concern and asking for an assurance that symbols and references to certification are not being misused.

If the misappropriating person continues in the misconduct, the President shall take such action as is deemed necessary to protect the integrity of the Certification Program,

including without limitation further oral and written contacts with the misappropriating person, suspension of membership in NPCA, and appropriate remedies through legal action, including litigation to obtain a cease and desist order and/or monetary damages. Further, NPCA shall seek the court's order that the Plant shall reimburse NPCA for all expenses incurred in obtaining judicial relief.

8.3 Product Listing

8.3.1 The plant shall receive a Product Listing Certificate, supplied by NPCA.

8.3.2 NPCA will grant the plant the right to use, in conformance with the program guidelines and contract, the appropriate Product Listing seal, emblem, logo, or stencil (Symbol) for product marking purposes for as long as the plant's Certification is in effect and provided such use is only in reference to the plant covered by the program contract, and not the company as a whole nor any other non-certified branch location. Additionally, the plant may only place the NPCA Product Listing Symbol or any other reference to the program on listed products produced at the plant location (s) covered under the NPCA Product Listing Program Application.

8.3.3 Listed products are registered with NPCA and are added to the NPCA published list of certified precast concrete plants. This listing is included in the NPCA Annual Membership Directory and on the NPCA website.

8.3.4 It is understood that in issuing a product listing certificate and Symbol, and authorizing its use, NPCA does not approve, endorse, or guarantee any inspections, product, system, or construction, or in any way make any expressed or implied warranties in connection with any inspection, product, system, or construction.

8.3.5 The product listing certificate and Symbol remain the property of NPCA and must be surrendered by the plant immediately in the event of expiration, probationary status, failure, decertification, termination of this contract, or withdraw from the program and any use of NPCA Product Listing Program literature, advertising, or stationery or any other materials referencing the program must immediately cease.

8.3.6 In the event that NPCA becomes aware of evidence that the Product Listing seal, emblem, logo, stencil or other Symbol or reference to certification is being used by an unauthorized person or organization, NPCA shall ask its General Counsel to assess whether the evidence is sufficient to issue a letter instructing the misappropriating person or organization to cease and desist from the misappropriation. If the evidence is deemed sufficient, the General Counsel shall issue a letter to the misappropriating person or organization.

If evidence is deemed not sufficient for a "cease and desist" letter, the President may issue a letter to the misappropriating person or organization expressing NPCA's concern and asking for an assurance that Symbols and references to certification are not being misused.

If the misappropriating person or organization continues the misconduct, the President shall take such action as is deemed necessary to protect the integrity of the Product Listing Program, including without limitation further oral and written contacts with the misappropriating person or organization, suspension of membership in NPCA, and

appropriate remedies through legal action, including litigation to obtain a cease and desist order and/or monetary damages. Further NPCA shall seek the court's order that the person or organization shall reimburse NPCA for all expenses incurred in obtaining judicial relief.

8.4 Renewal and Expiration

8.4.1 The plant's certification status shall be effective starting on the date of the initial audit, pending successful performance during the initial audit and subsequent re-audit, as detailed in the final audit report prepared by the audit agency. For NPCA Product Listing status shall be effective starting on the date of the passed plant audit and approval of the submittal package.

8.4.2 If the plant has not submitted payment of the program fees and any other paperwork required by the applicable program by January 1st each year, the plant's certification shall automatically expire.

8.4.3 If the plant that has been decertified for any reason in the past, the plant shall agree to the following:

8.4.3.1 If the plant is decertified the plant is responsible for all applicable fees required to reenter the program as a new plant to the program. Additionally, plants that have been decertified will have their anniversary dates reset to the date of when they reentered the program.

8.4.3.2 Payment of all prior financial obligations must be made prior to renewal of this agreement or any other agreement regarding NPCA Plant Certification.

8.4.3.3 If a plant is decertified, all product listings are terminated.

8.5 Violation of Contract

The plant agrees to abide by the terms of this contract. The plant understands that NPCA reserves the right to change the terms and conditions governing certification, including the NPCA Plant Certification Program Contract, the NPCA Product Listing Program Contract, the requirements set forth in the QC Manual, and use of Symbols, from time to time, and the plant shall abide by such changed provisions upon receipt of notice thereof, or otherwise withdraw from the program by surrendering its plaque and foregoing use of the certification Symbol. Violation of this contract, or any part thereof, including, without limitation, any misrepresentation in the NPCA Plant Certification Program Contract, the NPCA Product Listing Program Contract or elsewhere by the plant or misuse of the Symbol, constitutes grounds for the plant to be decertified. In the event that the plant is notified in writing by NPCA of such decertification, the plant shall immediately surrender its plaque and cease using the certification Symbol or facsimile thereof in any way. NPCA may obtain, if necessary, specific enforcement of plant's obligations described in the applicable program contract by seeking the injunction of any court having jurisdiction.

8.6 Hazardous Materials

If NPCA or its audit agency encounters, or reasonably suspects that it has encountered, hazardous materials in a plant under audit, NPCA or its agency shall cease activity at the plant and promptly notify the plant's management. The plant shall initiate action, where appropriate, to identify and investigate the nature and extent of hazardous materials in the plant and to abate and/or remove the same as may be required by federal, state or local statute, ordinance, code, rule, or regulation now existing or hereinafter enacted or amended. The services to be provided by NPCA and its audit agency do not include identification of hazardous materials, and NPCA and its audit agency have no duty to identify or attempt to identify the same within the area of the plant. NPCA and /or the audit agency representative need not re-enter the plant until they, in their sole discretion, are satisfied that hazardous material pose no problem to them.

Beginning on page 162 under Grading Schedule:

CHAPTER 1 GENERAL		Points (A)	Grade % (B)	(A x B) / 100	(A x B) Adjusted
1.1	Plant Quality Control Procedures and Management Policies				
	1.1.3 PQS & ACI Training Elements	6			
	1.1.4 Continuous Improvement	8			
	1.1.1 Plant Mgmt. & Personnel	3			
	1.1.2 Plant-Specific QC Manual				
	1.1.5 Plant Requirements				
Total Possible Points		257			
Total Applicable and/or Observed Points					
Deductions for repeat deficiencies from previous inspection					
PLANT SCORE (b)					

Should you have any questions about the changes to the NPCA Quality Control Manual for Precast Concrete Plants 14th Edition, January 2019, please contact Phillip Cutler, P.E., director of quality assurance programs, pcutler@precast.org, (800) 366-7731