

## **ADDENDUM January 2017**

### **Updates for the 12<sup>th</sup> Edition NPCA QC Manual**

#### **QCM-001, Rev. 3, 1-1-17**

The NPCA Quality Assurance Committee has again raised the bar on quality for NPCA Plant Certification. The format of notifying certified plants of these changes will not change for 2017. All certified plants will receive an email blast through Certification Express to the designated primary contact for each certified plant.

There are a number of changes, additions and several updates along with editorial changes to the 12<sup>th</sup> Edition for program year 2017. Membership will have a 60-day review and comment period that begins Nov. 8, 2016, and ends on Jan. 1, 2017.

Changes for 12<sup>th</sup> Edition – January 2017 are as follows:

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

**Beginning on page 58, under Section 4.5 Curing Concrete, extensive revisions have been made. The requirements now read:**

#### **4.5 CURING CONCRETE**

##### **4.5.1 General**

Effective curing shall begin as soon as possible, prior to the formation of shrinkage cracks, and no longer than 4 hours after casting the precast concrete unit. The concrete shall not exceed 150 degrees F (65 degrees C). If approved measures to prevent delayed ettringite formation (DEF) are employed concrete temperatures shall not exceed 160 degrees F (71 degrees C). Monitor a minimum of once every 3 months the maximum concrete temperature in the highest internal concrete temperature location(s). The highest internal concrete temperature shall be determined by testing. Verification testing and monitoring shall consider all product sizes, mix designs, and curing conditions when selecting the minimum amount of necessary testing. If concrete is cured with steam or radiant heat, curing procedures must be established and records also kept of the environment during the curing period (see 4.5.3).

##### **4.5.2 Curing by Moisture Retention**

Preventing moisture from evaporating from the exposed surfaces of precast concrete elements shall be considered an effective method of curing, provided the concrete temperature is above 55 degrees F (13 degrees C). If the concrete temperature is lower than 55 degrees F (13 degrees C) but above 35 degrees F (2 degrees C), and moisture evaporation is prevented, the curing period must be extended. Forms shall be considered effective in preventing evaporation from the contact surfaces. The use of a

membrane-curing compound applied thick enough to prevent evaporation of moisture shall also be considered an effective curing method.

Local regions and ambient temperature and humidity conditions will influence the need for curing with heat combined with moisture.

#### 4.5.3 Curing with Heat and Moisture

Concrete shall not be subjected to steam, hot air, or other means of accelerated curing until after the concrete has attained its initial set. Record the initial set of the concrete (ASTM C403) a minimum of once every three months per mix design when heat-curing. Steam, if used, shall be applied within a suitable enclosure that permits free circulation of the steam. If hot air is used for curing, precautions shall be taken to prevent moisture loss from the concrete. These requirements do not apply to products cured with steam under pressure in an autoclave.

The ambient curing temperature (for both wet-cast and dry-cast products) shall be monitored and documented a minimum of once per week, when employing accelerated curing with heat and moisture. The plant shall establish an ambient curing cycle that ensures that the ambient curing temperature does not exceed 160 degrees F (71 degrees C) or the maximum concrete temperature limit. In addition, the rise in ambient curing temperature shall be limited to a maximum of 40 degrees F (5 degrees C) per hour. Gas-fired heaters shall not be used to directly heat exposed concrete surfaces due to the risk of severe carbonation of the concrete.

#### 4.5.4 Plant Requirements:

1. Verify concrete does not exceed maximum temperature, per Section 4.5.1, for the highest heat generating mix designs, largest concrete mass, and hottest curing conditions.
2. If products are cured with heat and moisture in order to accelerate the strength gain, the ambient curing temperature shall be monitored during the curing period at least once per week. Temperature records shall be maintained in the plant records.
3. If heat curing is used, the necessary initial-set period shall be determined, per Section 4.5.3.
4. Products cast outdoors or in dry conditions shall be protected from moisture loss by application of a curing compound, moist curing or impervious sheeting.
5. The QC Inspector shall inspect curing of products and exposed surfaces of stripped products for evidence of plastic cracking. Damage shall be documented.

The entire Commentary has also been rewritten for Section 4.5.

**On page 85, Table 5.3.6 c Frequency of Quality Control Operations Aggregate and Concrete:** The table has been expanded to make it more readable.

**On page 87, under 6.2 Stormwater Concrete Pipe Requirements, the opening paragraph now reads:**

Plants producing concrete pipe shall specifically conform to the requirements in 6.2 of this manual.

**On page 92, the heading for Section 6.3 now reads:**

### 6.3 ROUND MANHOLE REQUIREMENTS

**On page 92, under Section 6.3, the opening paragraph now reads:**

Plants producing round manholes and associated components according to ASTM C478 “Standard Specification for Precast Reinforced Concrete Manhole Sections” shall specifically conform to the requirements in section 6.3 of this manual.

**On page 93, under Section 6.3.3.1 Absorption Testing; this requirement has been changed to a critical section and now reads:**

#### 6.3.3.1 Absorption Testing\*

The standard critical section text has been added to the commentary. The specific content of section 6.3.3.1 has not changed. In addition, the Grading Schedule has been updated to reflect making Section 6.3.3.1 a critical section with a single point value to match section 6.3.3.1 under Round Manhole Requirements. The balance of the section has been reformatted accordingly.

**On page 96, under Section 6.4.1 Absorption Testing; this requirement has been changed to a critical section and now reads:**

#### 6.4.1 Absorption Testing\*

The standard critical section text has been added to the commentary. The specific content of section 6.4.1 has not changed. In addition, the Grading Schedule has been updated to reflect making Section 6.4.1 a critical section with a single point value to match section 6.4.1 under Box Culvert Requirements. The balance of the section has been reformatted accordingly.

**On page 95, under Section 6.5, the opening paragraph now reads:**

Plants producing septic tanks shall document proof of conformance with ASTM C1227 “Standard Specification for Precast Concrete Septic Tanks”, IAPMO/ANSI Z1000

'Prefabricated Septic Tanks', or other manufacturing requirements mandated by the authority having jurisdiction. The plant shall specifically conform to the requirements in section 6.5 of this manual.

**Commentary:**

*It is suggested that plants producing septic tanks follow practices outlined in the "NPCA Precast Concrete On-site Wastewater Tanks Best Practices Manual."*

**On page 95, Section 6.5.2 has been extensively rewritten. It now reads:**

**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.

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 should be performed on each individual tank design.

**Commentary:**

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

**Beginning on page 99, Section 6.6 Grease Interceptor Requirements has been added and reads as follows:**

**6.6 GREASE INTERCEPTOR REQUIREMENTS**

Plants producing grease interceptor tanks shall document proof of conformance with ASTM C1613 "Standard Specification for Precast Concrete Grease Interceptor Tanks", IAPMO/ANSI Z1001 'Prefabricated Gravity Grease Interceptors', or other manufacturing requirements mandated by the authority or authorities having jurisdiction. The plant shall specifically conform to the requirements in section 6.6 of this manual.

**Commentary:**

*It is suggested that plants producing grease interceptor tanks reference the practices outlined in the “NPCA Precast Concrete On-site Wastewater Tanks Best Practices Manual.”*

6.6.1 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 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.*

6.6.2 Watertightness Testing\*

Tank watertightness shall be demonstrated according to the applicable section(s) of ASTM C1613, 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 grease interceptor tank produced in each grease interceptor 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.

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 should be performed on the largest (tallest) structure, as long as the same reinforcement design and concrete strength are used. Otherwise, testing should be performed on each individual tank design.

**Commentary:**

*\*Critical Requirement – plants participating in the NPCA Plant Certification Program must receive a minimum passing grade, as shown on the grading schedule, for section 6.6.2 and others designated as Critical Requirements, when applicable.*

*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 septic tanks or grease interceptors without additional testing.*

### 6.6.3 Plant Requirements:

1. Documentation of rational design calculations and/or proof-of-design testing of septic tanks shall be maintained at the plant indefinitely.
2. Watertightness test records shall be maintained on file at the plant for a minimum of three years.

**On page 133, in the Plant Terms and Conditions section, there have been a number of changes. They are noted below:**

Removed all references to the NPCA ON-SITE WASTEWATER CERTIFICATION PROGRAM. This program is discontinued effective 12-31-16.

**On page 139, under Part 4, Grading Schedules, sub-paragraph 4.5 in the last sentence: 'and' was changed to 'or.'**

**On page 146, under sub-section 7.2.13, a new sub-section 7.2.13.4 was created. It reads:**

- 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.

**The existing subsection 7.2.13.4 was renumbered to 7.2.13.5.**

**Beginning on page 155, the Precast Plant Grading Schedule has been modified as follows:**

Critical Sections for Absorption have been added to section 6.3 and 6.4 with an assigned point value of 1 point.

**Beginning on page 157, the Standardized Grading Tables have been resized to be more readable.**

**Beginning on page 160, the NPCA ON-SITE WASTEWATER CERTIFICATION GRADING SCALE has been removed from the manual.**

Should you have any questions about the changes to the NPCA Quality Control Manual for Precast Concrete Plants 12<sup>th</sup> Edition, January 2017, please contact Phillip Cutler, P.E., director of quality assurance programs at [pcutler@precast.org](mailto:pcutler@precast.org) or (800) 366-7731.