

NPCA QUALITY CONTROL AUDIT IN-PLANT AUDITOR CHECKLIST

Plant: _____ Location: _____

Assessment Date: _____ Auditor: _____

Color Legend:	Files	Plant	Both	Arch.	**Critical
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CHAPTER 1 - GENERAL

1.1 QUALITY CONTROL PROCEDURES AND MANAGEMENT POLICIES

- 1.1.1 ☐ Quality Control Program implemented by general manager or CEO.
- ☐ Licensed PE or SE must be on staff or under contract to perform and review calcs.
- 1.1.2 ☐ Plant Specific Quality Control Manual
- | | |
|--|---|
| <input type="checkbox"/> 1 Management QC policy statement | <input type="checkbox"/> 10 Product tolerances unless shown on product detail drawings and/or production documents |
| <input type="checkbox"/> 2 QC personnel organizational chart | <input type="checkbox"/> 11 Form tolerance and maintenance policy |
| <input type="checkbox"/> 3 Description of responsibilities for QC people | <input type="checkbox"/> 12 Mix design qualification and testing procedures |
| <input type="checkbox"/> 4 Description of training required for QC, production, ops. | <input type="checkbox"/> 13 Material testing policy and procedures |
| <input type="checkbox"/> 5 Housekeeping plan | <input type="checkbox"/> 14 Equip calibration |
| <input type="checkbox"/> 6 Product Pre, post, and final inspection procedures | <input type="checkbox"/> 15 Product performance test policy |
| <input type="checkbox"/> 7 Plant curing procedure for all seasons | <input type="checkbox"/> 16 Examples of all docs. and forms used by plant |
| <input type="checkbox"/> 8 Min. strength requirements for stripping and shipping | <input type="checkbox"/> 17 Documentation of franchising agreements |
| <input type="checkbox"/> 9 Product repair policy and procedures | |
- 1.1.3 ☐ QC Main & Backup current certification. **Note on report as Comment or Deficiency**
- Main QC Inspector _____ Date of _____ Date of _____
- Backup QC Inspector _____ ACI _____ PQS _____
- ☐ Training records, including course outline, syllabus, test results shall be on file at the plant for 5 years.
- 1.1.4 ☐ Continuous Improvement
- Performs a minimum of two of the following: (see section at end to record specifics)
- ☐ Producer Portal ☐ Self-Audits (semi-annual) ☐ Staff Education
- Additional Activities: (see section at end to record specifics)
1. Product 2. Processes 3. Facilities 4. Operational
- 1.1.5 ☐ Current Copy of NPCA QC Manual (14th Edition-2019)
- ☐ Current ASTMs Year: _____ ☐ Checks for updates ☐ Files of project specifications and requirements.
- ☐ Employee responsibilities and training.
- ☐ QC Meetings & Minutes once every 6 months
- ☐ Designate QC inspector for each shift and backup ☐ QC inspectors are not production managers
- ☐ Plants track & discuss product related customer complaints & corrective action. **Note on report as Comment or Deficiency**

1.2 PLANT SAFETY

- ☐ Safety manual and program to include requirements of local, state, fed laws and OSHA.
- ☐ Regular safety meetings minimum of once every month with list of attendees and minutes.

1.3 DRAWINGS & MOCK-UPS-(Architectural-see sections at end)



CHAPTER 2 MATERIALS

2.0 BUY AMERICAN

- ☐ Plants shall abide by Buy American Provisions as required and keep certs of compliance on file.
- ☐ Materials not domestically produced shall be segregated from those for Buy American use.

2.1 CONCRETE

- 2.1.1 ☐ Cement mill certificates each shipment or lot. Conform to C150 or C595. Supplier: _____
· Use the same cement of the same type and brand, and obtained from the same mill and lot
- 2.1.2 ☐ Fine & Coarse aggregate requirements
 - ☐ Coarse agg C33 conformance letter Date: _____ Supplier: _____
 - ☐ Deleterious substance testing (if C33 letter not available) ☐ _____ DOT Approved
 - ☐ If C33 and DOT approval are not on file, or aggregates are reactive: Evaluated for reactivity (per ASTM C1778 guide doc)
 - ☐ Fine agg C33 conformance letter Date: _____ Supplier: _____
 - ☐ Deleterious substance testing (if C33 letter not available) ☐ _____ DOT Approved
 - ☐ If C33 and DOT approval are not on file, or aggregates are reactive: Evaluated for reactivity (per ASTM C1778 guide doc)
 - ☐ Gradations: Fine Agg. 1,500 ton / Coarse Agg. 2000 ton or once per month
- 2.1.3 ☐ Lightweight aggregate Gradations: every 200 CY or once per month (ASTM C330)
- 2.1.4 ☐ Mix water shall conform to ASTM C1602 and/or shall be potable. ☐ Municipal Water Source
· Mix water shall not contain iron or iron oxides that may cause staining when using white cement
- 2.1.5 ☐ Chemical admixtures meet - ASTM C260, ASTM C494, ASTM C979, G109, C1017
Supplier: _____ Annual Cert. Date(s): _____
- 2.1.6 ☐ Supplementary Cementitious Materials mill certs. each shipment or lot
 - ☐ Fly ash C618 Supplier: _____
 - ☐ Silica Fume C1240 Supplier: _____
 - ☐ Slag C989 Supplier: _____
- 2.1.7 ☐ Water test report annually ☐ Raw material records for 3 years on file.

2.2 REINFORCEMENT

- 2.2.1. ☐ Current mill certs for bars A615 or A706 (weldable) for each shipment, on file 3 years.
- 2.2.2. ☐ Current mill certs for wire A1064 for each shipment and on file 3 years.
- 2.2.3. ☐ Current mill certs for bar mats A184 (bar mat) each shipment, on file 3 years
 - ☐ Current mill certs for Steel Wire, and WWR, Plain and Deformed A1064, each shipment, on file 3 years
- 2.2.4. ☐ Epoxy (A775) or zinc (A767) coated, A884 (epoxy wire), A934 (epoxy prefab bars)
 - ☐ CRSI certified applicator and certificate of compliance for epoxy coated reinforcement
 - ☐ stored and handled to min. damage to coating including UV (covered if outdoors longer than 2 months per ASTM A775)
- 2.2.5. ☐ QC Inspector crosschecks heat numbers are on file for all reinf. in use or in storage

2.3 MISCELLANEOUS MATERIALS

- 2.3.1 ☐ Capacity of commercial lifting devices marked on devices or posted in production areas
 - ☐ Lifting inserts verified for capacity, (OHSA recommend FS > 4)
 - ☐ Lifting hardware (slings, lift bars, chains, hooks, etc.) verified for capacity. (OHSA FS>5 recomment.)
- 2.3.2 ☐ Embedded plates and shapes meet A36 (unless otherwise req'd), with mill certs for each shipment.
- 2.3.3 ☐ Studs per ASTM A108 ☐ 30 degree bend test (per commentary)
- 2.3.4 ☐ Spacers, inserts, ties and accessories are adequate for purposes and minimize surface marring
 - ☐ Dissimilar metals not in contact unless surfaces are permanently protected against corrosion
 - ☐ Coated Tie wires with epoxy-coated reinforcement
- 2.3.5. ☐ Data shows that fiber reinforcement is not detrimental to the concrete or the product.
 - ☐ ASTM C1116 - "Specification for Fiber Reinforced Concrete and Shotcrete"
- 2.3.6 ☐ Annual certificates from supplier for joint sealants (ASTM C990)
Supplier(s)/Date(s): _____
 - ☐ Annual certificates from supplier for connectors (ASTM C923 and C1478)
Supplier(s)/Date(s): _____
- 2.3.7 ☐ Annual inspection of lifting apparatus (slings, hooks, etc); inspection records in plant files Date: _____
 - ☐ Non-commercial lifting hardware and inserts shall be proof-tested by certified testing lab for OSHA FS
 - ☐ Accessories and fiber reinforcement shall be appropriate for intended use.

CHAPTER 3 - CONCRETE

3.1 CONCRETE MIXES

- 3.1.1. ☐ Mix designs on file and at mixer for all mixes used. (SCC specific QC procedures)
 - ☐ 3.1.1.1 Normal, Heavywt, Mass Concrete-mix qualifications, and daily quality operations
 - ☐ 3.1.1.2 SCC: Initial mix qualification procedures estab. Plant follows 5.2 and 5.3
 - ☐ 3.1.1.3 Dry-cast: Initial mix qualification procedures estab. Incl. test result tolerances
 - ☐ 3.1.1.4 UHPC (ex.20,000 psi): Initial mix qualification procedures and daily quality control
 - ☐ 3.1.1.5 Concrete & Face Mix have similar characteristics: shrinkage, thermal exp., & mod. of elasticity
- 3.1.2 ☐ W/C _____: Max for freeze-thaw= 0.45, watertight = 0.48, salts = 0.40
- 3.1.3 ☐ Air-entrained if exposed to freeze-thaw. (see table for limits)
 - ☐ Water Structures under C913 or C1227 required 4-7% (C913 excludes pipe, box, utility, tanks, manhole)
- 3.1.4. ☐ Compressive strength for shipping _____ (minimum 2500 psi)
 - ☐ Cylinder test is average of TWO specimens from same batch, cured in same manner, tested at the same age
- 3.1.5 ☐ Admixtures used in accordance with manufacturers' instructions.
 - ☐ Admixture supplier shall supply certification/calibration of admixture dosing equipment annually (also see 5.1.3)
- 3.1.6 ☐ Mix proportions for each mix shall be clearly listed and maintained in plant files and at mixer.
 - ☐ Strength data shall be retained in the files for a minimum of three years
 - ☐ If products are shipped prior to obtaining strength data, additional cylinders shall be tested prior to shipping

3.2 BATCHING AND MIXING

- 3.2.1. ☐ Batching/Mixing conforms to C94 (Ready Mixed) or C685 (Volumetric)
- 3.2.2. ☐ Cement and Supplementary Cementitious materials protected from moisture.
- 3.2.3. ☐ Aggregate stockpiles – minimize segregation and contamination, no organic matter accumulation.
- 3.2.4. ☐ Batch scales calibrated within 0.2% at quarter points of anticipated load range (annually at minimum) (also see 5.1.3)
 - ☐ Batching tolerances. Cement $\pm 1\%$ (0-+4% <1CY), Water $\pm 1\%$, FA or CA $\pm 2\%$, Cum. Agg. $\pm 1\%$ Admix, $\pm 3\%$ (or \pm dose)
- 3.2.5. ☐ Blades spinning when material added. ☐ Material discharge sequence documented
- 3.2.6. ☐ Mixers checked daily for cleanliness & maintenance ☐ Mixer produces uniform concrete
- 3.2.7 ☐ Batch mixers: mix time or drum rotations established by ASTM C94 testing. ☐ Batch records kept on file
- 3.2.8 ☐ Ready Mixed plant conforms to 3.2.1-7 or NRMCA/DOT certified _____
 - ☐ Also, plant shall maintain: mix designs, batch tickets, truck delivery receipts, raw material certifications (2.1), gradations
 - ☐ Ready Mix Mix Designs ☐ Cement Mill Certificates ☐ Water Source/Test Records
 - ☐ Batch/Truck Delivery Tickets ☐ Aggregate C33 & Deleterious ☐ Fly Ash/SCM Mill Certificates
 - ☐ Water added recorded ☐ Aggregate Gradations ☐ Annual Chemical Admixture Certifications
- 3.2.9 ☐ Daily batch reports on file min. 3 years (for concrete produced at plant)

CHAPTER 4 - PRODUCTION PRACTICES

4.1 GENERAL

- 4.1.1. ☐ Physical layout: Production, handling, storage and shipment - efficient, safe, min. damage
- 4.1.2. ☐ Housekeeping plan? ☐ Plant is Clean/safe/efficient? ☐ Spot checks by QC inspectors daily?
- 4.1.3. ☐ Forms measured annually for dimensional conformance ☐ No form release build-up
 - ☐ Forms/Forming equipment prevents product damage from forces/vibrations
 - ☐ Forms create uniform products and dimensions
- 4.1.4. ☐ Inspection/maintenance records for Handling Equipment (cranes, forklifts)
- 4.1.5. ☐ Reinforcement fabricated with mechanized equipment check min of 1 or 3% daily (non Ch 6 products)
 - ☐ Machine made and/or dry cast-dimensional checks documented min 1 or 3% daily (not 6.2, 6.3, 6.4 products)Product(s): _____
- 4.1.6. ☐ Architectural Provisions - See table at end
- 4.1.7. ☐ Maintain records min 3 years, unless otherwise noted



4.2 FABRICATION OF REINFORCEMENT AND BLOCKOUTS

- ** 4.2.1. ☐ All reinforcing steel is fabricated to a detailed steel plan document.
 - ☐ Reinforcement Tolerances shown or referenced on plans or plant specific QC manual
 - ☐ Steel bent per CRSI and RSIC/IAAC standards ☐ Cages are rigid by tying or clipping
 - ☐ Damage to epoxy coating repaired; cut ends of epoxy-coated reinforcing repaired
- 4.2.2. ☐ Structural welds in compliance with ACI 318 & AWS D1.4
 - ☐ Structural welds performed on A706 steel or welded A615 need adequate carbon equiv. (documented calculation/value)
- 4.2.3. ☐ Welded steel assemblies (generally ASTM A36 steel) welded in compliance with AWS D1.1
- 4.2.4. ☐ Blockouts non-absorptive and held rigidly in place
 - ☐ Dimensional blockout tolerances shall be specified for each product and blockout type
- 4.2.5. ☐ Reinforcement fabricated within tolerances and supported rigidly.
 - ☐ Welding of ASTM A615 reinforcing steel is allowed when following an approved welding procedure meeting the requirements of AWS D1.4/1.4M. Copies of the approved welding procedure shall be included in the plant QSM and available for review.

4.3 PRE-POUR OPERATIONS

- 4.3.1. ☐ Forms cleaned after each use
- 4.3.2. ☐ Form release agent not over applied ☐ Form release agent not applied to reinforcing steel or embedded items
- ** 4.3.3. ☐ Concrete cover > 1/2 inch. ☐ Reinforcement placement does not move during casting
 - ☐ Detailed steel checks on one piece or 3% daily for wet cast (not including products covered in 6.2, 6.3, 6.4)
 - ☐ Bar size and spacing and/or WWR diameter and style and/or Steel Area and/or Quantity of Bars
 - ☐ Bar location (effective depth, etc) ☐ Concrete Cover (never less than 1/2" clear)
 - ☐ Cage Dimensions: length, width, height, diameter ☐ Lap splice length
 - ☐ Steel condition ☐ Hooks and bends (tied straight bars do not substitute bent bar at corner)
- 4.3.4. ☐ Embedded items positioned per plan ☐ Embedded items held rigidly during casting
- 4.3.5. ☐ Procedure in place to tell when form is ready for casting tags, verbal, or other.
 - ☐ Daily pre pour inspections performed, documentation on piece or production shift basis
 - ☐ Machine made product (dry-cast) pre-pour inspections a min. of form condition & reinforcing cages per 4.1.5 (or ch 6)

4.4 CASTING CONCRETE

- 4.4.1. ☐ Concrete transported with minimal contamination & segregation
- 4.4.2. ☐ Concrete deposited in forms with minimal free-fall, near final location
 - ☐ 4.4.2.1 and 4.4.2.2 Proper bonding between face mix and backup mix.
- 4.4.3. ☐ Proper use of vibrators ☐ Machine made products free of honeycombed areas
- 4.4.4. ☐ Unformed surfaces finished as specified or using a strike-off
- 4.4.5. ☐ Procedures for secondary pours are established and followed
- 4.4.6. ☐ Written procedures for hot weather prevent concrete temp. from exceeding 90°F if applicable
- 4.4.7. ☐ Written procedures for cold weather prevent concrete temp. from going below 45°F if applicable
- 4.4.8. ☐ Perform and document spot-check of concrete transport, placement, consolidation, & finishing

4.5 CURING CONCRETE

- 4.5.1. ☐ Curing started as soon as possible (max <4 hours after casting)
 - ☐ Concrete temp shall not exceed 150°F (no more than 160°F if measures to prevent DEF are employed-see commentary)
 - ☐ Monitor max concrete temp of highest internal concrete location a minimum of once every 3 months
 - ☐ Highest internal concrete temperature location determined by testing considering all products, mixes, & curing conditions
- 4.5.2. ☐ Moisture retention for products cast outdoors or in dry conditions
 - ☐ Extend curing time if concrete temperature is between 35°F and 55°F
- 4.5.3. ☐ For Accel. Curing, record initial set once per **quarter** for each mix (ASTM C403)
 - ☐ Ambient curing temp. documented weekly ☐ Max temp per 4.5.1, rise no more than 40°F/hour
- 4.5.4. ☐ QC inspector shall inspect curing of products and exposed surfaces of stripped products for plastic cracking
 - ☐ QC inspector documents plastic cracking damage



4.6 STRIPPING PRODUCTS FROM FORMS

- 4.6.1. ☐ Minimum strength achieved prior to stripping. ☐ Plant Defined Stripping Strength _____
☐ One-day Stripping strength tested min. quarterly (must be on pair of cylinders to comply with 3.1.4)
Frequency of 1-day breaks: _____
- 4.6.2. ☐ Product damage during stripping evaluated; major repair documented per 4.8.5
- 4.6.3. ☐ Formed surfaces have minimal air voids and honeycombing.
- 4.6.4. ☐ Post-pour inspection performed and documented. ☐ Major & Minor repairs doc. (see 4.7)
- 4.6.5. ☐ After post-pour inspection, a mark shall be made indicating product is acceptable, requires repair, or has been rejected

4.7 REPAIRING CONCRETE

- 4.7.1 ☐ Minor defects are repaired (OK to repair on truck or on site)
Minor Repair Material(s): _____
- 4.7.2. ☐ Major repairs evaluated by qualified personnel to establish repair procedure.
- 4.7.3. ☐ Major repairs inspected while repairs are made ☐ major repairs documented and on file
- 4.7.4 ☐ Documented procedures in place for identifying and performing repairs.
☐ Repaired product marked as acceptable or as rejected

4.8 STORAGE AND SHIPMENT OF PRODUCTS

- 4.8.1. ☐ Product marking per ASTM or industry spec. ☐ Products marked with "NPCA Certified Plant" symbol
- 4.8.2. ☐ Storage areas firm dry and level.
- 4.8.3. ☐ Products stored to minimize damage (stack ht, etc.). ☐ Rejects marked/kept separate
- 4.8.4. ☐ Trucks do not damage product during shipment
☐ Shipping records (1-year min. on file); records include which items, if any, were damaged when delivered
- 4.8.5. ☐ Final inspections performed and documented ☐ Repairs made & inspected
☐ Conforms to product requirements ☐ Contains the proper post-pour inspection markings
- 4.8.6. ☐ QC inspects storage area daily (doc not req'd).

CHAPTER 5 - QUALITY CONTROL OPERATIONS

5.1 SUMMARY OF REQUIRED RECORDS

- 5.1.1 ☐ Raw material test records, accessory reports, batch records, Buy America provisions, & certificates kept mini. of 3 years.
- 5.1.1.1 ☐ Third Party Lab ISO/IEC 17025 or AASHTO accreditation
☐ Maintain appropriate ACI Certificates for Third Party Lab personnel performing testing
☐ Maintain calibration records for equipment used by Third Party Lab
- 5.1.2. ☐ Work orders kept until project is finished. Product drawings kept for 3 years.
- 5.1.3. ☐ Annual equipment calibration

Check Calibrations (5.1.3)

- Cement Batching Scales
- Aggregate Batching Scales
- Water Meters
- Admixture batching equipment
- Concrete Comp. Test Mach.
- Portable Scales
- Air Meter
- Density (Unit Weight) Bucket
- Rebound Hammer
- Temp. Recorders
- Three-edge bearing machine
- Pipe-measuring devices (go-no-go)
- Vacuum & Hydrostatic testing eqp.

<u>Last Calibrated</u>	<u>Sticker Posted</u>

- 5.1.4 ☐ Aggregate and concrete test records kept at least 3 years.
- 5.1.5 ☐ Daily batch reports kept at least 3 years.
- 5.1.6 ☐ QC inspection records kept at least 3 years.
- 5.1.7 ☐ Documents are easily accessible and well-organized



NPCA
CERTIFIED PLANT



5.2 AGGREGATE TESTING

- 5.2.1 ☐ Gradation tests made on every 2,000 tons of coarse agg. and every 1,500 tons of fine agg.
- 5.2.2.1 ☐ Conventional or Dry Cast - Aggregate moisture content determined daily (without moisture probes in aggregate bins)
 - ☐ Conventional or Dry Cast with aggregate bin moisture probes, once per week to validate moisture probe calibration
- 5.2.2.2 ☐ For SCC with moisture probes, once per week to validate moisture probe calibration
 - ☐ For SCC without moisture probes, once per day prior 1st batch; then every 4 hrs & slump flow/vsi every 3 batches
- 5.2.3 ☐ Aggregate records maintained in plant records

**5.3 CONCRETE TESTING **

- 5.3.1.1 ☐ Conventional: Slump test every 150 CY or daily (whichever is first) for each mix
 - ☐ Performed in accordance with ASTM C143
- 5.3.1.2 ☐ SCC: Slump flow & VSI daily on 1st batch for each mix, then when changing mix designs/raw materials
 - ☐ Performed in accordance with ASTM C1611
- 5.3.2. ☐ Temperature taken when slump or air content tests are performed and when cylinders are made
 - ☐ Performed in accordance with ASTM C1064
- 5.3.3 ☐ Unit weight tests performed once per week or 150 CY (whichever is first) of each mix
 - ☐ Performed in accordance with ASTM C138
 - ☐ Lightweight: Every 100 CY or once per month (whichever is first)
- 5.3.4 ☐ Air content tests on air-entrained, wet-cast concrete for each 150 CY or daily (whichever is first) for each mix
 - ☐ Performed in accordance with ASTM C231
 - ☐ Non-air-entrained, wet-cast concrete: Air content tests when cylinders are made, but not less than once per week
- 5.3.5.1 ☐ Wet Cast cylinders per ASTM C31
- 5.3.5.2 ☐ Machine or Dry Cast cylinders vibrated per ASTM C497 or cores from product
- 5.3.5.3 ☐ SCC cylinders per ASTM C1758
- 5.3.5.4 ☐ 4 specimens for every 150 CY, or once per week (whichever is first)
 - ☐ Minimum 2 tested at or before 7 days, and if design strength not met; 2 at or before 28 days or age specified by design
 - ☐ Broken per C39 (Check Load Rates – now 35 psi +/- 7 psi/s – was 20 to 50 psi/s)
- 5.3.5.5 ☐ 3 cores if cylinders fall below specified value (ASTM C42)
- 5.3.5.6 ☐ Calibrated Impact Hammer- not used for acceptance or structural adequacy but for QC (ASTM C805)
- 5.3.6 ☐ Person conducting QC tests properly trained to perform tests (Section 1.1.3)
 - ☐ proper ACI Grade I techniques demonstrated
 - ☐ track # of breaks on each compression test pad
 - ☐ documentation outside testing agency-plastic testing: ACI certificate and calibration records for equipment used
 - ☐ documentation outside testing agency-compression testing: ACI certificate and calibration records for equipment used

Concrete Testing Data	Test Performed		Typical Cylinders Cast (per mix)
	Observed Value	Correctly (Y/N?)	
Slump/Slump Flow			Total: _____
Concrete Temperature			Freq: _____
Ambient Air Temperature			1-day: _____
Unit Weight			7-day: _____
Air Content			28-day: _____
Cylinders made (yes or no)			Other sets: _____



CHAPTER 6 - SPECIAL REQUIREMENTS

6.1 PRODUCTS MANUFACTURED ACCORDING TO ASTM and OTHER STANDARDS

- 6.1.1 Products manufactured per ASTMs or other industry standards, except for products in 6.2-6.5
 - ☐ In case of conflict with ASTM and other industry stds and product specs, the product specs, drawings, and contract documents govern (ex. Burial vaults VA spec governs)
- 6.1.2. ☐ Proof of conformance to ASTMs or other industry std on file: ☐ Design Calculations and Drawings
 - ☐ Proof of Design Testing or ☐ Documentation indicating meets ASTM min or other industry stds requirements.

6.2.1 STORMWATER CONCRETE PIPE

- ** 6.2.1.1. ☐ Documented Reinforcing Steel Inspection ☐ Inspect 1 or 3% (whichever is greater)
 - ☐ Detailed reinforcing drawings in production area. ☐ WWR style
 - ☐ steel area ☐ wire diameter ☐ cage diameter ☐ cage length ☐ welded/tied wire laps
- ** 6.2.1.2. ☐ Three-Edge Bearing (TEB) testing records ☐ Three Edge Bearing Observed by auditor
 - ☐ At min one (1) test for each size (and class) of pipe or as described in 6.2.1.2-see table for frequencies for each size
- *** **If allowed by project specifications or authority having jurisdiction, compressive strength cylinder testing and companion rational design calculations may replace TEB testing.**
- ** 6.2.1.3. ☐ Absorption test - ASTM C497 A or B, 1/year on mix w/lowest amount of cementitious materials; Date: _____
- 6.2.1.4. ☐ Post-Pour inspections documented ☐ Inspect 3 or 3% ☐ Internal dia.
 - ☐ Wall thickness ☐ Length of two opposite sides ☐ Joints to be checked for dim. conformance
- 6.2.1.5 ☐ Joint Design and Testing documentation on File ASTM C443 or C990, or per project specifications
 - ☐ Critical dimensions and tolerances indicated on joint design drawings
 - ☐ Testing on each size of gasket used (hydrostatic **or** vacuum) - on file indefinitely; 1 of 6.2.1.6/6.2.1.7
- 6.2.1.6 ☐ Joint Proof-of-Design Hydrostatic Testing (for gasketed joints) ASTM C497
 - ☐ Hydrostatic tested up to 3.5 psi for 12 min ☐ Leakage not exceed 0.041 oz/(inch dia)*(pipe length ft)
- 6.2.1.7 ☐ Joint Proof-of-Design Vacuum Testing (for gasketed joints)
 - ☐ Vacuum 7 in. mercury (3.5 psi) ☐ 6.9 in. over test time ☐ test time (s) = 1.5 X ID (in.)
- 6.2.1.8 ☐ Gasket QC – ☐ Annual Certification of Rubber Compound from Manufacturer and
 - ☐ Measurement or certification of critical physical characteristics per 6.2.6 by one of:
 - a: gasket supplier documentation; b: supplier audited standard certification (ISO, etc); c. precast supplier measurements
- 6.2.1.9 ☐ As required in 4.1.3 documentation of pallet, header and truing rings

6.2.2 SANITARY CONCRETE PIPE

- ** 6.2.2.1. ☐ Documented Reinforcing Steel Inspection ☐ Inspect 1 or 3% (whichever is greater)
 - ☐ Detailed reinforcing drawings in production area. ☐ WWR style
 - ☐ steel area ☐ wire diameter ☐ cage diameter ☐ cage length ☐ welded/tied wire laps
- ** 6.2.2.2. ☐ Three-Edge Bearing (TEB) testing records ☐ Three Edge Bearing Observed by auditor
 - ☐ At min one (1) test for each size (and class) of pipe or as described in 6.2.1.2-see table for frequencies for each size
- *** **If allowed by project specifications or authority having jurisdiction, compressive strength cylinder testing and companion rational design calculations may replace TEB testing.**
- ** 6.2.2.3. ☐ Absorption test - ASTM C497 A or B, 1/year on mix w/lowest amount of cementitious materials; Date: _____
- 6.2.2.4. ☐ Post-Pour inspections documented ☐ Inspect 3 or 3% ☐ Internal dia.
 - ☐ Wall thickness ☐ Length of two opposite sides ☐ Joints to be checked for dim. Conformance
- 6.2.2.5 ☐ Joint Design and Testing documentation on file ASTM C361 or C1628, or per project specifications
 - ☐ Critical dimensions and tolerances indicated on joint design drawings
 - ☐ Testing on each size of gasket used (hydrostatic **or** vacuum) - on file indefinitely: vacuum, watertightness, or per specs.
- 6.2.2.6 ☐ Joint Proof-of-Design Hydrostatic Testing if required
 - ☐ C361: 13 psi for 2.5 minutes, no leakage ☐ ASTM C1628: 13 psi for 2.5 minutes, no leakage
- 6.2.2.7 ☐ Watertightness Requirements: if required, perform per table in NPCA Manual
- 6.2.2.8 ☐ Off-Center Joint Proof Testing: if required, perform per ASTM C497 per size of gasketed pipe
- 6.2.2.9 ☐ Joint Shear Proof Testing: if required, perform per ASTM C497 per size of gasketed pipe
- 6.2.2.10 ☐ Confined Gasket Joint Proof Testing: if required, perform per ASTM C497 or C1628 per size of gasketed pipe
- 6.2.2.11 ☐ Gasket QC – ☐ Annual Certification of Rubber Compound from Manufacturer and
 - ☐ Measurement or certification of critical physical characteristics per 6.2.6 by one of:
 - a: gasket supplier documentation; b: supplier audited standard certification (ISO, etc); c. precast supplier measurements
- 6.2.2.12 ☐ As required in 4.1.3 documentation of pallet, header and truing rings

6.3 ROUND MANHOLE COMPONENTS REQUIREMENTS

- ** 6.3.1. ☐ Reinforcing Steel Inspection ☐ Detailed reinforcing cage drawings in production area.
 - ☐ Inspect and document 1 or 3% (whichever is greater) ☐ WWR style
 - ☐ Steel area ☐ Wire Diameter ☐ Cage diameter ☐ Cage Length ☐ welded/tied wire laps
- 6.3.2. ☐ Flat Top Slabs - Verified design by calcu or proof testing ASTM C-478, ASTM C497; signed off by licensed engineer
- ** 6.3.3.1 ☐ Absorption test - Once/year on mix w/ lowest cement mat'l ASTM C497 A or B; Date: _____
- 6.3.3.2 ☐ Annual Step Tests per C497 to meet C498 Date: _____ By: _____
- 6.3.3.3 ☐ Dimensional Checks-performed and documented on 3 (three) or 3% of each day's production (whichever is greater)
 - ☐ Checks include: internal diameter, wall thickness, height of 2 sides, verification of hole & invert locations and dims
- 6.3.3.4 ☐ Sanitary Manhole Vacuum testing documentation on file for 3 years, if required by authority having jurisdiction
- 6.3.4. ☐ Joints designed (ASTM C443 or C990) ☐ Critical dimensions and allowable tolerances indicated
- 6.3.5 ☐ Gasket QC - ☐ Annual Certification of Rubber Compound from Manufacturer
 - ☐ Measurement or certification of critical gaskets physical characteristics (see 6.3.5 for requirements)
- 6.3.6 ☐ Cage design drawings available in steel fab/production area
 - ☐ As in 4.1.3, documentation of pallet, header, and truing rings used at plant

6.4 BOX CULVERT REQUIREMENTS

- 6.4.1. ☐ Absorption test - 1/year on mix w/lowest amount of cementitious materials; Date: _____
- 6.4.2. ☐ Joint Design ☐ Critical dimension and allowable tolerances shown on design drawings
 - ☐ Proof of Design - Documentation indicating when assembled, joint gap < 3/4"
- ** 6.4.3. ☐ Pre-Pour Inspection-Critical Form Dimensions: Top, Bottom, and Wall Thicknesses
 - ☐ Pre-Pour Inspection-Detailed Reinforcement Check: steel area, WWR style, cage length, laps
 - ☐ Verify and document compliance for each box culvert
- ** 6.4.4. ☐ Post-pour Dimensional Checks ☐ One box per day in each form
 - ☐ Top Slab ☐ Bottom Slab ☐ Wall thicknesses ☐ Inside L x W x H
- 6.4.5. ☐ Pre-pour inspection and dim check documentation 3-years on file
 - ☐ Cage drawings in fabrication/production area

6.5 SEPTIC TANK REQUIREMENTS

- 6.5.1. ☐ Structural Proof-of-Design (Calculation or Proof of Design testing) per ASTM C1227 (less stringent than C1613)
 - ☐ Proof-Of-Design Testing for the maximum design burial depth, reviewed and signed-off by licensed engineer
 - ☐ Design calculations should be performed and stamped by qualified, licensed engineer
- ** 6.5.2. ☐ Watertightness testing per ASTM C1227, ASTM C1719, IAPMO/ANSI Z1000, or authority w/ jurisdiction (meet most stringent)
 - ☐ Minimum one test per year on a septic tank produced in each septic tank form (use largest for forms making multiple sizes) (use 1 test per SIZE for panelized forms) (requirement waived for tanks too large to assemble, test, and disassemble without damage)
 - ☐ Testing at plant signed off by QC Manager; Testing in field signed off by authority having jurisdiction
- 6.5.3. ☐ Watertightness testing on file a minimum of 3 years.
 - 6.5.3.3 ☐ For plants participating in the NPCA Product Listing Program, a watertightness test shall be witnessed by the agency inspector during the NPCA Plant Certification inspection. The tank to be tested shall be chosen at random from plant inventory by the agency inspector.**

6.6 GREASE INTERCEPTOR REQUIREMENTS

- 6.6.1. ☐ Structural Proof-of-Design (Calculation or Proof of Design testing) per ASTM C1613 (traffic rated)
 - ☐ Proof-Of-Design Testing for the maximum design burial depth, reviewed and signed-off by licensed engineer
 - ☐ Design calculations should be performed and stamped by qualified, licensed engineer
- ** 6.6.2. ☐ Watertightness testing per ASTM C1613, ASTM C1719, IAPMO/ANSI Z1001, or authority w/ jurisdiction (meet most stringent)
 - ☐ Watertightness testing per ASTM C1227 if cast in the same forms as septic tanks (C1227 testing is more stringent)
 - ☐ Minimum one test per year on a grease interceptor produced in each form (use largest for forms making multiple sizes) (use 1 test per SIZE for panelized forms) (requirement waived for tanks too large to assemble, test, and disassemble without damage)
 - ☐ Testing at plant signed off by QC Manager; Testing in field signed off by authority having jurisdiction
- 6.6.3. ☐ Watertightness testing on file a minimum of 3 years.
 - 6.6.3.3 ☐ For plants participating in the NPCA Product Listing Program, a watertightness test shall be witnessed by the agency inspector during the NPCA Plant Certification inspection. The tank to be tested shall be chosen at random from plant inventory by the agency inspector.**

PREVIOUS YEAR'S DEFICIENCIES

- ☐ Completed review of previous deficiencies in Auditor software and marked accordingly

1.3 DRAWINGS & MOCK-UPS

1. ☐ Erection drawings shall include elevations, dimensions, connection details, exposure of each piece (Custom-made & Standard precast units)
2. ☐ Mock-ups/samples shall be provided prior to production of architectural precast units

4.1.6 ARCHITECTURAL PROVISIONS

Architectural Products: _____

- ☐ 4.1.6.1 Surface finishes-free from defects, joint marks are within allowed color variations
- ☐ 4.1.6.1.1 As Cast- surfaces shall be cast against approved forms following industry stds, slight color variations, 1/4 inch dia surface holes ok, mock ups
- ☐ 4.1.6.1.2 Exposed Aggregate Finish-no honeycombing or seg of agg., surface retarders applied evenly
- ☐ 4.1.6.1.3 Abrasive Blast Finish
- ☐ 4.1.6.1.4 Acid Etch Finish-only after cured to min 4,000 psi; prior to acid being applied paint or seal exposed metal, use only acid resistant siliceous agg in concrete
- ☐ 4.1.6.1.5 Honed or polished
- ☐ 4.1.6.1.6 Bush-hammered or tooling
- ☐ 4.1.6.1.7 Veneer
- ☐ 4.1.6.1.8 Unformed Surfaces
- ☐ 4.1.6.1.9 Special Finishes
- ☐ 4.1.6.1.10 Architectural Finishes
- ☐ 4.1.6.1.11 Embedded Veneer
- ☐ 4.1.6.1.11.1 Stone Products
- ☐ 4.1.6.1.11.2 Clay Products

1.1.4 CONTINUOUS IMPROVEMENT

Note: Continuous improvement does not apply without passing audit result

Must complete 2 of the following 3 options to be considered for ANY continuous improvement points: Two pts. Maximum.

- ☐ Uploading current docs to Certified Producer Portal (earns 1 pt.)-must upload all except where N/A for plant's products
 - ☐ Annual plant profile sheet
 - ☐ Downloaded renewal certificate
 - ☐ Downloaded previous audit report
 - ☐ Current ANNUAL certifications including:
 - raw material annual certs, annual calibrations, ACI & PQS
- ☐ Perform semi-annual Self-Audits through Producer Portal (earns 1pt.) Date (1): _____ Date (2): _____
- ☐ Staff Education-1 hour of education for each employee annuall (earns 1pt.)
 - ☐ Plant QC Personnel: NPCA PQS training beyond current minimum in section 1.1.3; Industry education shall include course objectives, description, and certificate of completion
 - ☐ Plant Non-QC Personnel: Any NPCA course applies; Education shall include objectives, description, and certificate

Additional continuous improvement activities (earn up to 6pts. Max.)

Activities shall be from one or more of the following:

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

Objective evidence shall be on file to document cont improvement (documentation, policies, prodedures, visual examples)

Activity	Category	Description of Evidence

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