NPCA Quality Control Manual for Precast Concrete Plants
Standardized Grading System for Critical Requirements, Fifth Edition

General Grading Philosophy

- If the plant is meeting all the requirements at the proper frequencies, the records are well organized and easily retrieved, and no problems with that item are noted, they should be given a score of 100 percent for that item.
- Double deductions for major infractions / deficiencies
- The lowest possible score for each section is zero

- The following standard deductions should be subtracted from a grade of 100%, assuming that no other deficiencies are noted.

Section	Subsection	General Comments & Grading	Common Deficiencies	Deduction(s)
5.3 Concrete Testing		Fresh concrete tests should be performed at the required frequencies for each mix design used at the plant.		
	5.3.1 Slump, Slump Flow, and VSI	Upon discovering a test result that is out of tolerance, the plant must take immediate action to correct the non-conformance.	Testing not performed at all [choose this option or one or more of the following]	20%
			Testing not performed at proper frequency	5%
			Testing not performed correctly	5%
			Measured test results out of tolerance - no corrective action taken	5%
			Slump or slump flow test documentation is missing from files	5%
	5.3.2 Temperature	Upon discovering a test result that is out of tolerance, the plant must take immediate action to correct the non-conformance.	Temperature testing not performed at all [or one or more of the following]	20%
			Temperature testing not performed at proper frequency	5%
			Temperature testing not performed correctly	5%
			Measured temperature out of tolerance - no corrective action taken	5%
			Temperature testing documentation missing from file	5%
	5.3.3 Density (Unit Weight)	Upon discovering a test result that is out of tolerance, the plant must take immediate action to correct the non-conformance.	Density testing not performed at all [or one or more of the following]	10%
			Density testing not performed at proper frequency	2.5%
			Density testing not performed correctly	2.5%
			Measured test results out of tolerance - no corrective action taken	2.5%
			Density testing documentation missing from file	2.5%
	5.3.4 Air Content	Upon discovering a test result that is out of tolerance, the plant must take immediate action to correct the non-conformance.	Air content testing not performed at all on air enstrained concrete [or one or more of the following]	20%
			Air content testing not performed at proper frequency	5%
			Air content testing not performed correctly	5%
			Measured air content out of tolerance - no corrective action taken	5%
			Air content testing documentation missing from file	5%
	5.3.5 Compressive Strength	Compressive strength testing may be stopped upon reaching the design strength plus 10 percent. Testing to cylinder failure (crushing) must be performed at least once per month.	Compressive strength testing not performed at all [or one or more of the following]	30%
			Compressive strenght testing not performed at proper frequency	5%
			Compressive strength specimen not cast or cured correctly	5%
			Compressive strength specimen not tested correctly	5%
			Measured compressive strength out of tolerance - no corrective action taken	5%
			Number of specimen cast insufficient	5%
			Compressive strength testing documentation missing from file	5%
6.2 Stormwater Concrete Pipe Requirements		This section does not apply to sanitary pipe		
	6.2.1 Reinforcing Steel Inspection	All reinforcing steel cages should be checked by plant personnel for conformance to the design. For the sake of simplicity, 3 reinforcing steel cages or 3% of each production run should be checked on a random basis, regardless of whether or not they are fabricated with mechanized equipment.	Reinforcing steel checks are not performed at all [or one or more of the following]	100%
			Reinforcing steel checks are performed, but not consistently [deduction based on estimated % of checks not performed]	Estimate %
			Reinforcing steel checks performed incorrectly / measurements not accurate	10%
			Required data is missing from documentation, or is not measured	10%
			Reinforcing steel inspection documentation is missing from the file	20%
	6.2.2 Three-Edge Bearing Testing	Testing should be performed on each size and class of pipe produced at the plant, up to 60 inches in diameter. Unless testing to ultimate strength, it is not necessary to load the pipe beyond the ASTM-specified D-Load to produce a 0.01-in. crack.	TEB testing not performed at all [or one or more of the following]	100%
			TEB testing not performed at proper frequency [deduction based on estimate % of TEB testing not performed]	Estimate %
			TEB testing not performed correctly	20%
			Measured TEB test results out of tolerance	20%
			TEB test documentation incomplete	10%
			The plant is unable to test large diameter pipe due to the physical limitations of the test equipment	10%
	6.2.3 Absorption Testing	Absorption testing should be performed on both wet- and dry-cast mixes, with the lowest amount of cementitious material.	Absorption testing is not performed at all [or one or more of the following]	100%
			Absorption testing is performed, but not at the required frequency [estimate the % of missing tests]	Estimate %
			Absorption testing is not performed correctly	20%
			Absoption testing documentation is incomplete or missing from the plant files	10%
6.3 Round Manhole Component Requirements				
	6.3.1 Reinforcing Steel Inspection	All reinforcing steel cages should be checked by plant personnel for conformance to the design. For the sake of simplicity, 3 reinforcing steel cages or 3% of each production run should be checked on a random basis, regardless of whether or not they are fabricated with mechanized equipment.	Reinforcing steel checks are not performed at all [or one or more of the following]	100%
			Reinforcing steel checks are performed, but not consistently [deduction based on estimated % of checks not performed]	Estimate %
			Reinforcing steel checks performed incorrectly / measurements not accurate	10%
			Required data is missing from documentation, or is not measured	10%
			Reinforcing steel inspection documentation is missing from the file	20%

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Section	Subsection	General Comments & Grading	Common Deficiencies	Deduction(s)
6.4 Box Culvert Requirements				
	6.4.3 Pre-Pour Inspections	Critical form dimensions, including top, bottom and wall thicknesses, should be measured and documented for both wet - and dry-cast box culverts. In addition, reinforcing steel inspections should be performed and documented.	Form dimensions are not measured / checked at all on box culverts [or one or more of the following]	50%
			Form dimensions are measured, but not at required frequency [deduction based on estimated % of checks not performed]	Estimate %
			Required form dimension data is missing from documentation, or is not measured	5%
			Form dimension documentation is missing from the file	10%
			Reinforcing steel checks are not performed at all [or one or more of the following]	50%
			Reinforcing steel checks are performed, but not consistently [deduction based on estimated % of checks not performed]	Estimate %
			Reinforcing steel checks performed incorrectly / measurements not accurate	5%
			Required data is missing from documentation, or is not measured	5%
			Reinforcing steel inspection documentation is missing from the file	10%
	6.4.4 Dimensional Checks	These dimensional checks should be performed at the same time as the post-pour inspection	Product dimensions are not measured / checked at all on box culverts [or one or more of the following]	100%
			Product dimensions are measured, but not at required frequency [deduction based on estimated % of checks not performed]	Estimate %
			Required product dimension data is missing from documentation, or is not measured	5%
			Product dimension documentation is missing from the file	10%
6.5 Septic Tank Requirements		The plant should have a listing of all forms that are used for casting onsite wastewater tanks. The listing should include information on the various design options the plant is capable of producing with each form. This listing will be used by the inspector to ensure that tanks from each of the forms have been tested and have the required documentation associated with them. In cases when multiple tank sizes are manufactured using the same form, structural 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 tank design.		
	* 6.5.1 Structural Proof-of-Design	* This section is currently a Critical Requirement only for the Septic Tank-Only Program. Proof-of-design documentation should consist of either engineering design calculations or an engineering report on the structural proof testing.	No structural proof-of-design is available [or one or more of the following]	100%
			Proof-of -design documentation is available, but it is not available for all designs [deductions is based the % of documentation missing, as compared to the listing of forms and designs]	Estimate %
			Proof-of-design documentation is missing information, such as maximum burial depth, etc.	20%
	6.5.2 Watertightness Testing	Watertightness testing should be performed according to ASTM C1227, as a minimum. More stringent test protocol is acceptable, when required by the authority or authorities having jurisdiction	No watertighness testing is performed at the plant or no documentation exists on file [or one or more of the following]	100%
			Watertighness testing documentation is available, but it is not available for all designs [deductions is based the % of documentation missing, as compared to the listing of forms and designs]	Estimate %
			Watertighness testing documentation is missing information, such as dates, test values, etc.	10%