

# Quality Management System for the Ready Mixed Concrete Industry

## *Executive Summary*

This project was funded by request of the National Ready Mixed Concrete Association (NRMCA) P2P Steering Committee to support the initiative for Prescription-to-Performance (P2P) Specifications for Concrete. As part of its P2P strategic plan, the P2P Steering Committee feels that it is important to have a system in place that establishes the credibility of the concrete producer that furnishes performance-based concrete mixtures. The output from this project will be provided to the P2P Steering Committee for their future deliberations and it is anticipated that NRMCA will develop a means for distributing the final document(s).

The purpose of these guidelines is to assist ready mixed concrete producers in the preparation of a Quality Manual. The Quality Manual documents the quality processes that the company has in place to insure quality of the company's products and services. These guidelines define minimum quality system requirements for conformance to performance-based specifications. The guidelines allow for the structured development of a Quality Manual, clear to the producer and the purchaser. The Quality Manual is flexible in design in anticipation of possible future certification requirements or other qualification criteria, as set forth by the purchaser in the contract documents. Besides outlining the primary sections of the Quality Manual, the guideline provides suggestions to the producer on items that should be covered in the producer's specific Quality Plan. The Guideline Manual includes a comprehensive set of appendices of existing NRMCA documents and forms that support the document. The general outline follows that used for Quality Systems in the ISO 9000 certification of manufacturing companies.

In addition to these guidelines for the development of a Quality Manual, an example Quality Manual has been prepared for the fictitious organization, Global Ready Mixed Company (Global). The Global Quality Manual is for illustration purposes only and does not serve to establish standard practices or even minimum requirements for a Quality Manual. The Quality Manual for each producer may vary significantly, based on the size and the capability of the organization, the type(s) of market served, and the geographic locations of their plants.

The elements of these Guidelines and the sample Quality Manual do not represent recommendations of the RMC Research Foundation or the National Ready Mixed Concrete Association.

### **Future Action**

The P2P Committee is working on finalizing the details of the two documents and will approve the general concept. The Committee has identified those items in the Quality Manual that could be audited in a certification of a company and will work from this list of items to develop a certification program for concrete producers that could satisfy a prequalification requirement for performance-based projects. The decision to develop a certification program has yet to be decided.

### **Sections Covered in the Quality Manual**

<b>1.</b>	<b>Introduction</b>	2.1	General
1.1	General	2.2	Documentation Requirements
1.2	Quality Policy	2.2.1	Quality Manual
1.3	Terms and Definitions	2.2.2	Responsibility and Authority
<b>2.</b>	<b>Quality Management System</b>	2.2.3	Control of Documents

2.2.4	Control of Quality Records	7.5	Materials Handling and Stockpile Procedures
<b>3.</b>	<b>Management Responsibility</b>	7.6	Customer Property
3.1	General	<b>8.</b>	<b>Concrete Mix Design or Selection</b>
3.2	Planning	8.1	General
3.2.1	Quality Objectives	8.2	Determination of Mix Proportions and Selection of Component Materials
3.2.2	Quality Management System Planning	8.3	Evaluate Mix Design or Selection Criteria
3.2.3	Product Realization	8.4	Evaluate Mix Design or Selection Performance
3.2.3.1	Planning	8.5	Compare Design/Selection Performance to Project Requirements
3.3	Responsibility and Authority	8.6	Concrete Mix Design Verification
3.4	Internal Communications	8.7	Concrete Mix Design Validation
3.5	Management Review	8.8	Control of Changes to Concrete Mix Designs
3.6	Work Environment	8.9	Concrete Mix Summary
<b>4.</b>	<b>Customer Focus</b>	<b>9.</b>	<b>Purchasing</b>
4.1	General	9.1	Introduction
4.2	Customer Satisfaction	9.2	Purchasing Process
4.3	Customer Input	9.3	Purchase Orders
4.4	Complaint Management	9.4	Purchasing Information
4.5	Customer Connections	9.5	Verification of Purchased Product
<b>5.</b>	<b>Human Resources</b>	<b>10.</b>	<b>Order Processing and Dispatching Procedures</b>
5.1	General	10.1	General
5.2	Competence	10.2	Order Entry
5.3	Quality Awareness	10.3	The Dispatch Process
5.4	Training	10.4	Batch Instructions
<b>6.</b>	<b>Facilities, Plant(s) and Equipment</b>	10.5	Recordkeeping
6.1	General	<b>11.</b>	<b>Concrete Production</b>
6.2	Infrastructure	11.1	General
6.2.1	Ready Mixed Concrete Plants	11.2	Production Planning
6.2.2	Laboratory Facilities	11.3	Concrete Production
6.3	Control of Monitoring and Measuring Devices	11.4	Production of Specialty Concrete
6.4	Equipment Maintenance	11.5	Production Environment
6.4.1	Cement and Pozzolan Silos	11.6	Control of Plant Operations
6.4.2	Aggregates	11.6.1	Materials Receiving
6.4.3	Chemical Admixtures	11.6.2	Materials Storage and Handling
6.4.4	Batching Equipment	11.6.2.1	Cement and Pozzolan Silos
6.4.5	Central Mixer	11.6.2.2	Aggregates
6.4.6	Truck Mixers	11.6.2.3	Chemical Admixtures
<b>7.</b>	<b>Materials Management</b>	11.6.3	Weighing and Batching
7.1	General	11.6.3.1	Measuring Accuracy
7.2	Supplier Qualifications and Selection	11.6.3.2	Batching Accuracy
7.3	Supplier Requirements (Expectations)	11.6.3.3	Batching Procedures
7.3.1	Coarse Aggregates	11.6.4	Mixer and Mixer Controls
7.3.2	Fine Aggregates	11.6.4.1	Central Mixer
7.3.3	Cement		
7.3.4	Fly Ash and Ground Granulated Blast-Furnace Slag		
7.3.5	Chemical Admixtures		
7.4	Conformance Monitoring		

11.6.4.2	Truck Mixers	14.3	The Investigation
<b>12.</b>	<b>Concrete Testing</b>	14.4	The Analysis
12.1	General	14.5	Summary Report
12.2	Concrete Tests Frequency and Mix Selection	<b>15.</b>	<b>Measurement, Analysis and Improvement</b>
12.3	Sampling and Testing of Freshly Mixed Concrete	15.1	General
12.4	Testing Hardened Concrete	15.2	Monitoring and Measurement
<b>13.</b>	<b>Concrete Delivery and Site Control</b>	15.2.1	Customer Satisfaction
13.1	General	15.2.2	Internal Audits
13.2	Truck Tracking	15.2.3	Monitoring and Measurement of Process
13.3	Jobsite Monitoring and Control	15.2.4	Monitoring and Measurement of Product
13.4	Identification and Traceability	15.3	Control of Nonconforming Product
<b>14.</b>	<b>Concrete Troubleshooting</b>	15.4	Analysis of Data
14.1	General	15.5	Improvement
14.2	Complaints and Inquiries	15.5.1	Corrective Action
		15.5.2	Preventive Action