



# NRMCA QUALITY BENCHMARKING SURVEY REPORT

2024

## Abstract

The 2024 NRMCA Quality Benchmarking Survey is the ninth annual survey extracted from the NRMCA Excellence in Quality Award applications received in May-June 2024. The survey is facilitated by the NRMCA Research Engineering and Standards Committee. This report establishes benchmarks for various aspects of a company's quality management system. Data from respondents is from the most recent fiscal year. There were a total of 51 companies or divisions participating in the 2023 survey representing production of approximately 58 million cubic yards (15% of estimated ready mixed concrete production in the US).

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## 2024 NRMCA Quality Benchmarking Survey Report

### Introduction

The 2024 NRMCA Quality Benchmarking Survey is the tenth annual survey based on information from the Quality Award applications received in May-June 2024. Original surveys conducted between 2010 and 2016 were based on survey questionnaires. Since 2017 this quality benchmark information has been obtained from companies participating in the annual NRMCA Excellence in Quality Award. Results of this survey are compiled with those of more recent years to capture trends. Surveys were completed by NRMCA member company ready mixed concrete producers, either representing the whole company or a division of the company. The survey is supported by the NRMCA Research Engineering and Standards Committee.

This report establishes benchmarks for various aspects of a company's quality management system. The weighted average reported is determined by multiplying the percent volume of each company listed and the individual company average statistic.

For this survey, respondents were asked to use data from the most recent fiscal year. Respondents were asked to avoid guessing and not to respond to questions where information was not available. There were a total of 51 in the 2024 survey compared to 47 participants in 2023.

#### 1. Annual Concrete Volume (cubic yards)

The respondents to this survey produced a cumulative 59.6 million cubic yards representing approximately 16% of estimated ready mixed concrete produced in the US in 2024. In 2023, the participation was 15% of the estimated production. For this survey, the smallest entity produced 51,350 yd<sup>3</sup> while the largest entity produced 6.1 million yd<sup>3</sup>. Of the 51 respondents, 32 had annual production exceeding 500,000 yd<sup>3</sup> and therefore the data weighted towards larger companies. The breakdown of the company annual concrete volume for this and previous surveys is as follows:

Annual Concrete Volume, yd <sup>3</sup>	Number of Respondents					
	2024	2023	2022	2021	2020	2019
≤ 100,000	1	1	2	1	1	0
100,00 to 250,000	8	8	7	8	8	7
250,000 to 500,000	10	7	7	8	9	9
500,000 to 1 Million	14	12	11	10	8	11
1 to 3 Million	14	17	17	16	14	11
> 3 Million	4	2	3	2	2	3
<b>Total Respondents</b>	<b>51</b>	<b>47</b>	<b>47</b>	<b>45</b>	<b>42</b>	<b>41</b>
<b>Survey Total, million yd<sup>3</sup></b>	<b>59.6</b>	<b>57.5</b>	<b>59.5</b>	<b>55.2</b>	<b>51.6</b>	<b>52.3</b>

#### 2. Provide information on two most common concrete mixtures with Specified Strength ≤ 5000 psi for the last fiscal year

Specifications should not include any one of the following requirements - Max w/cm or minimum cementitious factor or fixed over-design value such as 1200 psi or early-age strengths

	Weighted Average					
	2024	2023	2022	2021	2020	2019
Standard deviation (S), psi	522	507	487	467	432	435
Avg. Specified strength, psi	3902	3838	3879	3698	3632	3590
Strength increment, %	36%	34%	34%	34%	33%	36%
Mixtures that are air entrained, %	39%	33%	38%	38%	38%	38%

According to ACI 214R-11, standard deviation of 500-600 psi and 400-500 psi would qualify as a good and very good standard of concrete control for general construction testing, respectively. It is generally recognized that the

standard deviation of strength test results of air-entrained concrete is higher than that of non-air-entrained concrete.

Strength increment, also referred to as overdesign, represents the difference between the average strength and the specified strength for the two mixtures reported by the respondent. The weighted average strength increment is 36% (1420 psi). Using this weighted average standard deviation, the overdesign required in accordance with ACI 301 is 716 psi.

Producers were asked not to include mixtures that were controlled by specified maximum w/cm, minimum cementitious content, those that require a fixed strength increment greater than specified strength, or an early-age strength requirement, because these specification requirements result in higher average strength. Assuming that 1 lb/yd<sup>3</sup> of cementitious materials corresponds to a compressive strength of 8 psi the actual strength increment in excess of that required by ACI 301 (1420 – 716 = 704 psi) represents excess cementitious material use of approximately 88 lb/yd<sup>3</sup>.

### 3. Concrete rejected at jobsite as a percent of production

*Report percent based on total volume or loads. Include all rejected loads for reasons associated with quality, specification, or delivery requirements such as slump, air, temp, etc. Include loads rejected due to quality issues that were beneficially reused. Do not include concrete returned due to ordering excess quantities.*

The weighted average of concrete rejected at the jobsite is calculated as 0.31% of the production compared to 0.30% reported in the 2023 survey. The distribution of responses was as follows:

Percent Concrete Rejected	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
0.0	0	0	0	0	0	5
> 0 to 0.1	43	38	47	47	36	24
> 0.1 to 0.5	41	38	34	40	45	46
> 0.5 to 1.0	4	13	9	7	14	10
> 1.0	4	4	4	2	0	5
Reported as <1.0	0	0	0	NA	NA	7
Did not respond	8	6	6	4	5	2

The actual number varied from a low of 0.0007% to 2.4%. Verbal estimates of returned concrete, which includes quantities returned due to excess ordered tend to be higher, suggesting that a primary reason for returned concrete is based on customers ordering practices rather than for quality reasons.

### 4. Concrete with internal quality issues discovered before the load was delivered as a percent of production

*Internal quality issues could be due to dispatch/batching errors (incorrect order batched, the wrong mix batched, incorrect batch weights, etc.), truck breakdown, driver lost, or traffic delays.*

The weighted average of concrete with internal quality issues was calculated as 0.73% of the production compared to 0.96% reported in the 2023 survey.

Percent Concrete with Internal Quality Issues	Percent of Respondents				
	2024	2023	2022	2021	2020
0.0	0	0	0	0	0
> 0 to 0.1	27	36	43	29	31
> 0.1 to 0.5	41	26	28	42	36
> 0.5 to 1.0	8	9	4	7	10
> 1.0	8	13	9	7	7
Reported as <1.0	0	0	0	0	0
Did not respond	16	17	17	16	17

### 5. Cost to a company to resolve customer problems, in \$ per yd<sup>3</sup> produced.

Include all charges paid to a third party due to a concrete quality such as finishability, ability to pump, setting time, strength, cracking, scaling, color, putting epoxy on a parking garage slab, remove and replace etc. For example, if the company produced a total of 20,000 yd<sup>3</sup> of concrete and the total cost paid out for the above reasons was \$20,000 the cost should be calculated and reported as \$1/yd<sup>3</sup>.

The weighted average cost to resolve customer problems was calculated as \$0.25/yd<sup>3</sup> compared to \$0.21/yd<sup>3</sup> in 2023. The reported statistic varied from \$0.01 to \$2.19/yd<sup>3</sup>. The distribution of responses was as follows:

Cost to Company. \$/yd <sup>3</sup>	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
0.0	0	0	0	7	7	0
> 0 to 0.2	51	64	62	62	60	68
> 0.2 to 0.5	20	9	23	20	17	20
> 0.5 to 1.0	12	9	4	2	10	5
> 1.0	4	6	4	0	0	0
Did not respond	14	13	6	9	7	7

### 6. The number of claims made related to quality in the last 12 months per 100,000 yd<sup>3</sup> of production.

The weighted average number of claims related to quality was calculated as 0.89, compared to 0.99 reported in the 2023 survey. The distribution of responses was as follows:

No. of claims per 100,000 yd <sup>3</sup>	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
0.0	0	4	9	9	5	2
> 0.0 to 0.5	37	30	34	31	29	32
> 0.5 to 1.0	16	21	11	16	10	17
> 1.0 to 2.0	18	15	23	18	29	32
> 2.0 to 3.5	10	4	0	13	12	7
>3.5	6	11	11	7	12	5
Did not respond	14	15	13	7	5	5

### 7. Frequency of internal quality audits to verify conformance to Company's quality manual.

Frequency of Audit	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
None	6	4	2	0	2	2
Annually	92	94	87	89	91	93
> Annually	2	2	11	9	7	5
Did not respond	0	0	0	2	0	0

### 8. What is the process to act on customer feedback to address company quality?

Customer Feedback Process	Percent of Respondents			
	2024	2023	2022	2021
Update the quality manual and communicate corrective action or Identify root cause for corrective action	100	100	100	100
Did not respond	0	0	0	0

### 9. Number of field and laboratory technicians per 100,000 yd<sup>3</sup> of annual production

The weighted average was calculated as one field/laboratory technician for 125,000 yd<sup>3</sup> compared to one technician for 146,000 yd<sup>3</sup> reported in 2023. The weighted average for respondents with production less than 500,000 yd<sup>3</sup> was one technician for 57,000 yd<sup>3</sup> compared to one technician for 76,000 yd<sup>3</sup> reported in 2023. The distribution of responses was as follows:

No. of field/lab techs / 100,000 yd <sup>3</sup>	Concrete volume per technician, yd <sup>3</sup>	Percent of Respondents					
		2024	2023	2022	2021	2020	2019
≤ 0.5	≥ 200,000	14	19	19	16	26	17
> 0.5 to 1.0	< 200,000 to 100,000	45	36	49	44	38	54
> 1.0 to 2.0	< 100,000 to 50,000	31	34	19	29	24	20
> 2	< 50,000	10	9	13	11	12	7
Did not respond		0	2	2	0	0	0

### 10. Number of technical managers for every 100,000 yd<sup>3</sup> of annual production

The weighted average was calculated as one technical manager with responsibility for 414,000 yd<sup>3</sup> compared to one manager for 477,000 yd<sup>3</sup> in the 2023 survey. The weighted average for respondents with production less than 500,000 yd<sup>3</sup> was one technical manager with responsibility for 183,000 yd<sup>3</sup> compared to one individual for 191,000 yd<sup>3</sup> in 2023. The distribution of responses was as follows:

No. of technical managers per 100,000 yd <sup>3</sup>	Concrete volume per technical manager, yd <sup>3</sup>	Percent of Respondents					
		2024	2023	2022	2021	2020	2019
≤ 0.167	≥ 600,000	20	26	30	24	36	32
> 0.167 to 0.250	< 600,000 to 400,000	25	23	26	29	24	22
> 0.250 to 0.500	< 400,000 to 200,000	39	34	23	24	17	29
> 0.500 to 1.000	< 200,000 to 100,000	10	11	13	16	14	12
> 1.000	< 100,000	6	4	9	7	10	2
Did not respond		0	2	0	0	0	0

### 11. Percent of lab and field technicians with ACI certification or equivalent

Percent of technicians with ACI certification	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
< 60	2	0	0	2	2	NA
60 to 90	12	13	9	9	10	NA
> 60	0	0	NA	NA	NA	100
> 90	86	87	91	89	88	NA
Did not respond	0	0	0	0	0	0

### 12. Number of hours of technical continuing education supported or required by company and documented for technical service and QC personnel

This question was asked for the first time in 2022.

Education Hours	Percent of Respondents		
	2024	2023	2022
None	2	4	13
< 8 hr	12	9	15
> 8 hr	86	87	72
Did not respond	0	0	0

### 13. Quality costs, in terms of \$ / yd<sup>3</sup> produced

*Include lab costs, all overheads, and all quality control staff salaries including corporate-level technical managers. Do not include back charges or penalties*

The weighted average of quality costs was calculated as \$1.24/yd<sup>3</sup> compared to \$1.15/yd<sup>3</sup> in 2023. The breakdown was as follows:

Quality Cost to Company. \$/yd <sup>3</sup>	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
0.00	0	0	0	0	0	0
≤ 0.75	10	15	15	18	17	17
> 0.75 to 1.25	35	38	40	40	43	41
> 1.25 to 1.75	25	17	17	11	17	17
> 1.75	24	17	15	22	19	20
Did not respond	6	13	13	9	5	5

### 14. Percent of production facilities that are inspected or certified – NRMCA, state highway department, or other

Because the answer choices were changed, direct comparisons with past responses could not be made.

Percent of Plants	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
30 to 60	NA	NA	NA	NA	NA	0
< 60	2	2	4	0	2	NA
60 to 90	6	9	6	4	10	NA
> 60	NA	NA	NA	NA	NA	100
> 90	92	89	89	96	88	NA
Did not respond	0	0	0	0	0	0

### 15. Number of company laboratory facilities possessing at least one strength testing machine

The weighted average was calculated as 1 laboratory with at least one strength testing machine per 397,000 yd<sup>3</sup> of production compared to 1 lab per 421,000 yd<sup>3</sup> reported in 2023. The weighted average for respondents with production less than 500,000 yd<sup>3</sup> was one lab for 133,000 yd<sup>3</sup>, compared to one lab for 132,000 yd<sup>3</sup> in 2023.

No. of labs per 100,000 yd <sup>3</sup>	Concrete volume per one lab, yd <sup>3</sup>	Percent of Respondents					
		2024	2023	2022	2021	2020	2019
0.0	NA	0	0	0	0	2	2
> 0.0 to 0.2	≥ 500,000	33	38	38	33	31	34
> 0.2 to 0.4	< 500,000 to 250,000	39	26	26	24	29	24
> 0.4 to 0.6	< 250,000 to 167,000	8	15	11	16	12	17
> 0.6	< 167,000	20	19	26	24	26	20
Did not respond		0	0	2	0	0	2

### 16. Is the company's central laboratory(ies) inspected by a third party (such as CCRL) or does it participate in a proficiency sample testing program with other labs involved?

Percent of Inspected Labs	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
Yes	69	72	68	73	71	68
No	31	28	32	27	29	32
Did not respond	0	0	0	0	0	0

**17. Frequency of measuring aggregate moisture content (plants or aggregate types not using moisture probes)**

Frequency of Aggregate Moisture Measurement	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
At least daily	80	81	79	84	86	88
Weekly	10	13	19	9	10	7
> Weekly	8	6	2	7	2	2
Did not respond	2	0	0	0	2	2

**18. Frequency of calibration of moisture probes per plant (plants or aggregate types using moisture probes)**

Frequency of calibrating moisture probes	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
Weekly	57	60	62	60	62	61
Monthly	20	21	17	20	24	20
Quarterly or greater	8	6	9	11	5	12
Did not respond	16	13	13	9	10	7

**19. Frequency of aggregate grading tests per plant**

Frequency of measuring aggregate grading	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
Use agg supplier's data	22	30	28	29	19	20
Weekly	39	32	26	20	24	22
Monthly	25	28	34	44	45	49
Quarterly or Greater	14	11	13	7	12	10
Did not respond	0	0	0	0	0	0

**20. Frequency at which cementitious materials are out of tolerance (ASTM C94) for loads > 4 yd<sup>3</sup> (% of total)**

Batches out of tolerance, %	Percent of Respondents				
	2024	2023	2022	2021	2020
Batch records seldom reviewed	2	0	0	0	0
≤ 1	51	51	66	64	50
Between 1 and 3%	35	40	32	29	33
≥ 3	8	9	2	7	17
Did not respond	4	0	0	0	0

**21. Frequency per month at which production concrete mixtures are tested by obtaining plant samples – average per plant. Do not include testing for mix development or optimization**

Frequency of Plant Testing per month	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
≤ 3	16	40	26	16	17	27
4 to 10	24	34	30	29	29	32
> 10	61	26	45	56	55	41
Did not respond	0	0	0	0	0	0

**22. State the number of instances in the last 12 months when an incorrect ingredient material was accepted or was later tested and was not consistent as ordered. Calculated per 100,000 yd<sup>3</sup>.**

*Some examples are fly ash pumped into cement silo, incorrect aggregate size delivered, aggregate grading tested out of spec. etc.*

Errors per 100,000 yd <sup>3</sup>	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
0.0	18	13	21	27	31	0
> 0.0 to 0.5	45	38	40	31	33	56
> 0.5 to 1.0	12	11	6	16	10	15
> 1.0 to 3.0	12	17	13	9	12	10
> 3.0	4	4	2	9	2	7
Did not respond	10	17	17	9	12	12

**23. Cement batching accuracy. Reported as percent of target cement batch weight.**

Cement Batching Accuracy, % of target weight	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
< 0.0	10	13	13	16	17	15
0.0	2	4	4	0	5	20
> 0.0 to 0.5	43	47	43	40	50	46
> 0.5 to 1.0	20	17	23	22	10	7
> 1.0	8	11	4	7	10	5
Did not respond	18	9	13	16	10	7

**24. Average time per truck between loading and leaving the plant.**

*Time required for mixing after batching, washdown, slump rack adjustment, etc.*

Average time per truck, min	Percent of Respondents			
	2024	2023	2022	2021
< 7	16	15	19	22
7 to 12	71	68	66	64
> 12	6	9	6	7
Did not respond	8	9	9	7

**25. What percent of loads require adjustment for slump and/or air content at the jobsite - for projects with testing/acceptance criteria?**

Loads requiring adjustment, %	Percent of Respondents			
	2024	2023	2022	2021
< 30	84	83	72	62
30 to 60	10	13	15	22
> 60	0	0	0	0
Did not respond	6	4	13	16

**26. Do you measure the yield of at least the top-selling mixture at each plant at least 1/week?**

Measure Yield?	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
Yes	78	77	81	71	64	76
No	22	23	19	27	36	24
Did not respond	0	0	0	2	0	0



**27. How does the average measured yield compare with target yield?**

Measured yield compared to target yield, %	Percent of Respondents					
	2024	2023	2022	2021	2020	2019
Within 1	78	77	70	71	67	68
1 to 2	18	23	30	27	31	32
> 2	2	0	0	0	0	0
Did not respond	2	0	0	2	2	0

**Conclusion**

This was the tenth survey on quality benchmarks conducted by NRMCA under the direction of the Research Engineering and Standards Committee. The goal of the survey is to evaluate typical resources and to establish industry benchmarks that support quality initiatives in ready mixed concrete companies. The benchmarks allow for continual improvement in the industry.