# [2. ENGINEERING DELIVERABLES: GET IT RIGHT THE FIRST TIME (RS320-1)](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time)

**Report Summary:** This study developed a uniform definition and method of measurement for engineering/design deliverable quality that is usable by project owners, managers, quality managers, contractor design managers, and discipline leads. High quality design deliverables are complete, correct, and timely. The study identified 11 common detailed design deliverables that often suffer from quality problems and developed a completeness checklist for each of the 11 problematic deliverables. The study also identified leading indicator metrics that can warn of defect-prone deliverables and developed two assessment tools to assess design deliverable quality and completeness throughout the detailed design process, beginning with front-end engineering design (FEED) validation and continuing through issued-for-construction. These two assessment tools are:

* The Design Deliverable Quality Assessment (DDQA) tool that identifies threats to deliverable quality by focusing on leading indicators.
* The Completeness of Design Deliverable Checklist (CDDC) that provides a method for the consistent measurement of deliverable completeness.

The application of these two tools can help project teams achieve complete, correct, and timely results for the 11 commonly problematic design deliverables. By aligning project expectations and better predicting deliverable completeness, projects should benefit from reduced rework and improved cost and schedule performance.

**Key Takeaways:**

## (1) Apply the Design Deliverable Quality Assessment (DDQA) tool to proactively identify and eliminate or plan the mitigation of potential quality defects among the 11 problematic deliverables listed in [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time).

## (Project Phase: Detailed Scope through Construction)

The 11 problematic deliverables are: front-end engineering design (FEED) validation; Level 3 baseline schedule; constructability inputs; piping and instrumentation diagrams (P&IDs); equipment specifications and data sheets; maintainability inputs; vendor data; 3D model + 3D model reviews + clash detection; piping routing and isometrics; nozzles, ladders, and platforms for towers/vessels/tanks; and miscellaneous pipe support drawings.

* Focus first on the 11 problematic deliverables and use the DDQA tool to identify potential quality defects.
* Scrutinize the completeness of each deliverable using the Completeness of Design Deliverables checklist to ensure that all necessary information is included.
* Review and analyze the identified potential defects with project teams, design managers, and other stakeholders to develop mitigation plans or corrective actions.
* Implement and track the effectiveness of the implemented mitigation plans for each problematic deliverable to eliminate or minimize quality defects.
* Monitor and verify that all 11 problematic deliverables meet the required standards and specifications before proceeding with further construction activities.

## (2) Scrutinize the completeness of the 11 problematic deliverables using the Completeness of Design Deliverables Checklist (CDDC) tool, and plan corrective actions for achieving complete deliverables.

## (Project Phase: Detailed Scope through Construction)

* Review and analyze each of the 11 problematic deliverables using the CDDC tool to identify incomplete or missing information.
* Identify specific completeness issues for each deliverable type by examining the checklist output and discussing the findings with project teams, design managers, and other stakeholders.
* Develop a plan to address the identified completeness gaps by prioritizing corrective actions, allocating resources, and establishing timelines for the completion of outstanding tasks.
* Implement and track the effectiveness of the planned corrective actions to ensure that complete and accurate deliverables are achieved for each problematic deliverable type.
* Verify that all 11 problematic deliverables meet the required standards and specifications before proceeding with further construction activities.

## (3) Integrate the use of the two tools, the DDQA and the CDDC, into the work processes of design management and project quality management.

## (Project Phase: Detailed Scope through Construction)

* Develop a comprehensive training program to educate design managers and project quality managers about the usage and benefits of the two tools.
* Incorporate regular tool-based reviews and audits as part of the design management and project quality management workflows.
* Mandate the use of the DDQA and CDDC for all design deliverables to ensure consistency across projects and teams.
* Establish a centralized repository to store and track the results obtained from the two tools to facilitate data-driven decision-making.
* Conduct regular assessments and evaluations to ensure the effective integration of the two tools into daily operations and identify areas for improvement.

## (4) Incorporate the knowledge gained from [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time) in design quality training programs.

## (Project Phase: Detailed Scope through Construction)

* Update existing design quality training programs to include the findings and best practices presented in [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time).
* Develop new modules or courses that focus specifically on the 11 problematic deliverables, highlighting their common defects and corrective actions.
* Integrate the case studies and real-world examples found in [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time) into training materials to enhance learner engagement and retention.
* Ensure that trainers are equipped with the knowledge and tools necessary to effectively convey the information obtained from [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time) to design professionals.
* Review and revise existing quality control processes and procedures in accordance with the findings of [RS320-1](https://www.construction-institute.org/engineering-deliverables-get-it-right-the-first-time) and incorporate them into future training programs.

## (5) Consider design deliverable defects, their impacts, and causal factors when expanding the DDQA tool in the future to accommodate more deliverables.

## (Project Phase: Detailed Scope through Construction)

* Identify potential design deliverable defects that may arise during project execution.
* Analyze the root causes of these defects to develop targeted mitigation strategies.
* Develop expanded DDQA criteria to capture additional design deliverables and their associated quality metrics.
* Review existing design management processes to ensure seamless integration with the updated DDQA tool.
* Refine training programs for designers, engineers, and project managers to use the enhanced DDQA tool effectively.

## [(6) Tool: Tools for Enhancing the Quality of Problematic Design Deliverables (IR320-2)](https://www.construction-institute.org/tools-for-enhancing-the-quality-of-problematic-design-deliverables)

## (Project Phase: Detailed Scope through Construction)

These tools are designed to:

* Identify and address the 11 most problematic design deliverables that have common defects and causal factors.
* Implement the DDQA and CDDC to assess quality and completeness in design deliverables, thereby enabling corrective actions.
* Engage project stakeholders, such as engineering managers and quality directors, in using these tools for improved design quality.
* Utilize leading and lagging metrics for proactive and reactive assessments across the various project phases.
* Be integrated into design management processes to mitigate risks and enhance overall project performance.