

Guide to Commercial Grade Dedication: Procuring Items and Services for Nuclear Applications

A practical 10-step reference for quality, engineering, procurement, and supplier oversight personnel

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Purpose of This Guide

Commercial grade dedication (CGD) provides a controlled path for accepting commercial items or services for use in nuclear safety-related applications. It helps ensure that commercially available products and services are evaluated against the requirements relevant to the intended nuclear application before they are accepted for use.

This guide explains CGD in practical terms and provides a structured workflow that can be applied by personnel across varying experience levels, from those newly supporting dedication activities to experienced practitioners responsible for technical evaluations, procurement controls, supplier oversight, and quality assurance implementation.

What Commercial Grade Dedication Means

CGD bridges the gap between the commercial marketplace and the nuclear quality assurance environment. A commercial item or service may be widely available and technically suitable, but it still must be evaluated, verified, and documented before it can be credited for a nuclear safety function.

ASME NQA-1 Part II, Subpart 2.14 is the primary consensus standard that drives the CGD process for nuclear quality assurance applications. It establishes the framework for determining whether an item or service is commercial grade, identifying the item or service's safety function, selecting critical characteristics, and verifying those characteristics through appropriate dedication methods.

Subpart 2.14 is important because it connects technical evaluation with quality assurance controls. Rather than accepting a commercial item or service based only on supplier claims or catalog information, the dedicating entity must use a planned, documented, and

technically justified process that provides reasonable assurance the item or service will perform its intended safety function.

ISO 19443 is also relevant to nuclear supply chain quality management because it applies requirements to organizations supplying products and services important to nuclear safety. The standard addresses commercial grade considerations within the broader context of nuclear quality management, supplier control, traceability, and prevention of counterfeit, fraudulent, and suspect items. However, ISO 19443 does not provide the detailed methodology for performing commercial grade dedication. Organizations using ISO 19443 should therefore rely on applicable contract requirements, customer requirements, regulatory commitments, and standards such as ASME NQA-1 Part II, Subpart 2.14 when establishing how CGD is planned, performed, verified, and documented.

While the applicable edition of ASME NQA-1 Part II, Subpart 2.14 is typically the primary standard driving commercial grade dedication, facility customers may also invoke other industry references that support CGD implementation. NRC Regulatory Guide 1.164 describes methods the NRC considers acceptable for meeting regulatory requirements for dedicating commercial-grade items and services used in nuclear power plants. EPRI NP-5652 and its later revisions provide widely used industry guidance for accepting commercial-grade items in nuclear safety-related applications, including practical considerations for identifying and verifying critical characteristics. DOE guidance, including the DOE Commercial Grade Dedication Guidance and DOE-HDBK-1230-2019, provides additional implementation examples, case studies, and process guidance for DOE and NNSA nuclear facilities. These documents are useful references, but they should be applied in alignment with the governing contract, licensing basis, regulatory commitments, approved quality assurance program, and the applicable edition of ASME NQA-1 Part II, Subpart 2.14.

CGD is not merely an inspection activity. It is an engineering, procurement, and quality process that identifies the attributes necessary to support the safety function, determines how those attributes will be verified, and defines the evidence needed to support acceptance.

Key Terms

Table 1. Key Commercial Grade Dedication Terms

Term	Plain-Language Meaning
Commercial grade item or service	An item or service available from the commercial marketplace and not provided under a nuclear quality assurance program.
Dedication	The acceptance process used to provide reasonable assurance that a commercial item or service will perform its intended safety function.
Safety function	The function the item or service must perform to protect public health and safety, workers, the environment, or the facility safety basis.
Critical characteristic	A measurable or verifiable attribute that must be correct for the item or service to perform its safety function.
Dedicating entity	The organization responsible for performing and documenting the dedication process.

When Commercial Grade Dedication Is Needed

CGD is typically needed when an item or service will be used in a safety-related or safety-significant application, but the supplier is not providing it under the applicable nuclear quality assurance requirements. It may apply to replacement parts, components, calibration services, testing services, engineering services, software, or material testing.

Before starting CGD, confirm that dedication is allowed by the customer contract, design requirements, procurement documents, facility procedures, and applicable regulatory or code commitments.

Responsible Parties and Duties

CGD is a cross-functional activity. The dedicating entity should define the responsible organizations, approval authorities, technical reviewers, and quality verification roles before the dedication process begins. Clear responsibility assignments help ensure that engineering decisions, procurement controls, supplier oversight activities, and quality records remain aligned throughout the dedication effort. These responsibilities should be documented in an approved process procedure to support consistent implementation.

The dedicating entity is the organization that takes responsibility for accepting the commercial item or service for the intended nuclear application. Depending on the project and contractual arrangement, the dedicating entity may be the licensee, owner, engineering, procurement, and construction organization, design authority, nuclear supplier, or another organization authorized by contract and quality assurance program to perform dedication. The dedicating entity must have the authority, procedures, technical

competence, and quality controls needed to perform and document the dedication process.

The responsible engineering organization (REO) is the party that owns or controls the technical basis for the item or service in its intended application. This may be the design engineering group, system engineering organization, component engineering group, cognizant engineer, design authority, or another technically qualified organization assigned responsibility by procedure or contract. Sometimes the responsible engineering organization is the customer or customer directed (third party). For procured commercial items, the REO should be clearly identified so there is no ambiguity about who approves the safety function, design inputs, critical characteristics, acceptance criteria, technical evaluation, and engineering basis for acceptance.

Quality assurance or quality control personnel support the process by verifying that dedication activities are performed under approved procedures, reviewing objective evidence, confirming that inspections and tests are properly documented, evaluating supplier controls when applicable, and ensuring nonconformances are processed through the approved quality system.

Procurement personnel ensure that purchase documents include the correct technical, quality, documentation, inspection, and record requirements. They also help ensure that suppliers understand the required documentation, hold points, source verification needs, and restrictions on substitution or changes.

Supplier oversight or source verification personnel may be responsible for witnessing activities, reviewing supplier records, confirming implementation of applicable controls, and reporting results to the dedicating entity. Final acceptance should be made only by personnel or organizations authorized by the applicable quality assurance program and procedures.

Table 2. Responsible Parties and Typical Duties

Responsible Party	Typical Duties
Dedicating entity	Ensures the dedication process is complete, technically justified, documented, reviewed, and approved for the intended application. May be the licensee, owner, EPC organization, design authority, nuclear supplier, or another authorized organization.

Responsible engineering organization	Owns or controls the technical basis for the item or service in its intended application. This role may be performed by design engineering, system engineering, component engineering, the cognizant engineer, the design authority, or another assigned technical organization. Typical duties include confirming the safety function, identifying design and service conditions, selecting or approving critical characteristics and acceptance criteria, evaluating suitability, and approving technical evaluations when required.
Quality assurance or quality control	Verifies procedural compliance; reviews objective evidence; confirms inspection and test records; evaluates quality controls; ensures nonconformances are documented and dispositioned.
Procurement	Flows down technical, quality, documentation, inspection, and record requirements to suppliers; controls purchasing changes and substitutions.
Supplier oversight or source verification	Witnesses or verifies supplier activities; reviews supplier records; documents oversight results; communicates issues to the dedicating entity.
Final acceptance authority	Confirms the dedication package is complete, reviews acceptance evidence, verifies required approvals are in place, and authorizes final acceptance or release when assigned by the applicable quality assurance program and procedures.

Commercial Grade Dedication Workflow

Step 1: Define the Item or Service

Clearly identify what is being dedicated. Include part numbers, model numbers, specifications, drawings, service scope, supplier information, and any limitations on use. For services, define the exact activity being performed, such as calibration, testing, inspection, analysis, or repair. Confirm that the item or service meets one of the applicable commercial grade definitions in NQA-1 Part II, Subpart 2.14.

Step 2: Determine the Safety Function

Identify what the item or service must do in the nuclear application. The safety function should be specific, technically accurate, and traceable to design documents, procurement requirements, system descriptions, safety basis documents, or applicable procedures.

Prerequisite Note: Two conditions ***must be satisfied before*** an item or service can be accepted through commercial grade dedication. First, the item or service must meet the applicable commercial grade definition in NQA-1 Part II, Subpart 2.14. Second, it must have a defined safety function in the intended nuclear application. If either condition is not met, CGD is not the appropriate acceptance path, and supplier or item qualification should be addressed through the applicable NQA-1 Part I requirements.

Once Steps 1 and 2 have been completed and documented, the process may proceed to Step 3.

Step 3: Create the Commercial Grade Dedication (CGD) Plan

After the item or service is confirmed to meet the applicable commercial grade definition and the safety function is identified, document the planned dedication approach in a Commercial Grade Dedication plan. The plan should identify the item or service, intended application, safety function, applicable requirements, responsible parties, required reviews and approvals, expected records, and final acceptance authority.

At this stage, the plan may serve as a controlled planning document that is completed and refined as the technical evaluation, critical characteristics, acceptance criteria, dedication methods, and sampling approach are developed. Changes to the plan should be reviewed and approved before implementation when they affect critical characteristics, acceptance criteria, verification methods, or acceptance decisions.

The dedicating entity is responsible for ensuring the CGD plan is created, controlled, reviewed, and approved in accordance with the applicable quality assurance program and implementing procedures. In most cases, the responsible engineering organization prepares or provides the technical content for the plan because it owns the safety function, design inputs, service conditions, critical characteristics, and technical acceptance basis.

Quality assurance, procurement, supplier oversight, and other affected organizations should support the plan by reviewing the portions within their scope. For example, engineering should confirm the technical basis, quality should confirm procedural and record requirements, procurement should confirm supplier flow-down requirements, and supplier oversight should confirm any source verification or survey activities. The final approval authority should be identified in the plan before verification activities begin.

Step 4: Create the Technical Evaluation

Prepare a technical evaluation to document the engineering basis for the dedication activity and to support the CGD plan. The technical evaluation should confirm why CGD is appropriate, identify the applicable requirements and intended application, define or reference the safety function, evaluate design and service conditions, and provide the technical basis for selecting critical characteristics and acceptance criteria.

The technical evaluation supports and refines the CGD plan because it provides the technical basis for the dedication strategy, critical characteristics, acceptance criteria, verification methods, sampling approach, and final acceptance basis. When assumptions, design inputs, or service conditions change, the technical evaluation should be reviewed to determine whether the dedication plan must be revised.

Step 5: Identify Critical Characteristics

Critical characteristics are the attributes that must be verified so the item or service can perform its safety function. They may include physical, chemical, dimensional, performance, environmental, documentation, personnel qualification, process, or functional attributes.

Examples include material grade, pressure rating, thread size, voltage rating, calibration accuracy, seismic qualification, temperature range, chemical composition, test method, technician qualification, or control of measuring and test equipment.

The following example illustrates how critical characteristics may be organized for a dedication activity. Actual characteristics, acceptance criteria, and verification methods should be based on the item or service, its intended safety function, and applicable design and procurement requirements.

Table 3. Example Critical Characteristics for Items and Services

Example Item or Service	Critical Characteristic	Acceptance Criteria	Typical Verification Method
Pressure-retaining valve	Pressure rating	Meets specified pressure class and design requirements.	Review manufacturer documentation and perform inspection or testing as required.
Pressure-retaining valve	Body material	Material grade matches the procurement specification or approved drawing.	Review material test report and verify markings or material identification.
Fastener	Material grade and mechanical properties	Meets specified grade, strength, hardness, and dimensional requirements.	Review certified material test report and perform dimensional or hardness testing as required.
Electrical component	Voltage and current rating	Ratings meet or exceed the design and service conditions.	Inspect nameplate data and review manufacturer technical documentation.
Calibration service	Measurement accuracy and traceability	Calibration results meet specified tolerance and are traceable to recognized standards.	Review calibration certificate, procedure, equipment records, and accreditation scope as applicable.
Testing service	Procedure control and personnel qualification	Testing is performed using approved methods by qualified personnel.	Review procedure, qualification records, test report, and quality records.

Step 6: Establish Acceptance Criteria

For each critical characteristic, define the acceptance criteria before verification begins. Acceptance criteria should be objective, measurable where possible, and traceable to a

design requirement, code, standard, procurement specification, drawing, procedure, approved engineering basis, or other controlled technical source.

Acceptance criteria should state the required result clearly enough that a reviewer can determine whether the characteristic passed or failed without relying on interpretation. When practical, criteria should include numerical limits, tolerances, required standards, required documentation, required qualifications, applicable procedure revisions, environmental conditions, and any limits on sampling or applicability.

Avoid acceptance criteria that are vague, subjective, or dependent only on supplier statements, such as “acceptable,” “meets requirements,” or “per manufacturer documentation,” unless the specific requirement and the method for verifying it are also identified. Strong acceptance criteria should connect the critical characteristic to a defined technical basis and should be practical to verify using the selected dedication method.

The following examples show how acceptance criteria can be written so they are specific, verifiable, and traceable to the applicable technical basis.

Table 4. Example Acceptance Criteria for Critical Characteristics

Critical Characteristic	Example Acceptance Criteria	Basis or Source	Notes for Use
Material grade	Material grade matches the specified ASTM, ASME, procurement, or approved drawing requirement.	Procurement specification, drawing, code requirement, or approved bill of material.	Confirm the exact material designation and applicable revision, edition, or grade.
Dimensional fit	Measured dimensions are within the tolerances shown on the approved drawing or specification.	Approved drawing, vendor catalog data, or engineering specification.	Identify which dimensions are safety-significant before selecting inspection points.
Pressure rating	Rated pressure equals or exceeds the required design pressure for the intended application under the applicable service conditions.	Design calculation, system requirement, drawing, or procurement document.	Verify that the pressure rating applies at the required temperature and service conditions.
Electrical rating	Voltage, current, frequency, and environmental ratings meet or exceed design requirements.	Design specification, equipment data sheet, nameplate requirement, or manufacturer technical data.	Consider qualification and environmental requirements, not only nominal electrical ratings.

Calibration accuracy	Calibration results are within the required tolerance and are traceable to recognized standards.	Calibration procedure, purchase order, equipment specification, or quality program requirement.	Ensure the certificate includes as-found and as-left data when required.
Personnel qualification	Personnel performing the service meet the required training, certification, or qualification criteria at the time the work is performed.	Procedure, contract requirement, code requirement, or supplier qualification record.	Verify that the qualification was current and applicable to the specific activity.

Step 7: Select Dedication Methods

Select one or more verification methods that provide adequate confidence that the critical characteristics have been met. The method must be appropriate for the characteristic being verified and the risk associated with the application. Below are examples:

Table 5. Commercial Grade Dedication Methods

Method	How It Is Used	Example
Method 1: Special tests, inspections, or analyses	Directly verifies selected characteristics through examination, measurement, testing, or analysis.	Dimensional inspection, material testing, pressure testing, or functional testing.
Method 2: Commercial grade survey of the supplier	Evaluates whether the supplier's controls are adequate for the specific characteristics being accepted.	Surveying a calibration laboratory's process controls and equipment traceability.
Method 3: Source verification	Witnesses or verifies activities at the supplier's facility before shipment or service completion.	Witnessing a factory acceptance test or reviewing in-process inspection records.
Method 4: Acceptable supplier/item performance record	Uses documented historical performance when it is relevant, objective, and sufficient for the application.	Reviewing successful prior supply history for the same item used in the same application.

Note: Dedication methods may be used individually or in combination, as permitted by the applicable customer, contract, quality assurance program, and CGD procedure. Some customers may require Method 1, special tests, inspections, or analyses, to be used whenever other methods are applied, or may not allow Methods 2, 3, or 4 to be used as the sole basis for acceptance. Method 1 is commonly combined with Method 2 or Method 3 to provide both direct verification and supplier-process confidence. Method 4 should be used with caution and only when the performance record is relevant, objective, current, and sufficient for the specific item, supplier, and intended application.

Step 8: Perform Verification Activities

Carry out the planned inspections, tests, surveys, source verifications, or performance record reviews. Use qualified personnel, approved procedures, calibrated equipment, controlled sampling plans, and documented results as required by the quality program.

Step 9: Review Results and Accept or Reject

Compare the verification results against the established acceptance criteria. If all required critical characteristics are verified and documented, the item or service may be accepted for the specified application. If requirements are not met, document the nonconformance and evaluate disposition through the approved process.

Step 10: Complete the Dedication Package

The dedication package should provide a complete and traceable basis for acceptance. A reviewer should be able to understand what was dedicated, why dedication was needed, what safety function was involved, which critical characteristics were verified, how they were verified, what results were obtained, and who approved acceptance.

Dedicating Services

Although the workflow above applies to both items and services, services often require additional attention to process controls because the acceptability of the final output depends heavily on how the work is performed.

Service dedication focuses on the controls that ensure the service output is acceptable. For example, dedicating a calibration service may require verification of technician qualifications, calibration procedures, equipment traceability, environmental controls, records, uncertainty requirements, and reporting format.

For services, the dedication approach should evaluate the process controls that directly affect the service output. NQA-1 Part II, Subpart 2.14 provides additional direction for applying commercial grade dedication to services, including consideration of the controls used to perform, verify, and document the service.

Typical Documentation

- Commercial Grade Dedication plan
- Technical evaluation
- Procurement specification or purchase order requirements
- Safety function determination
- Critical characteristics and acceptance criteria
- Selected dedication methods and justification

- Inspection, test, analysis, survey, or source verification records
- Supplier documentation, as applicable
- Nonconformance records and dispositions, if applicable
- Final acceptance or release documentation
- Quality assurance record retention information

Common Mistakes to Avoid

- Starting dedication after procurement without defining requirements up front.
- Using generic critical characteristics that are not tied to the safety function.
- Accepting supplier certificates without verifying whether they satisfy the dedication plan.
- Relying on supplier reputation instead of objective evidence.
- Applying a previous dedication package to a different application without evaluating differences.
- Failing to control sampling, test methods, personnel qualifications, or measuring equipment.
- Not documenting the technical basis for acceptance.

Quick CGD Checklist

Table 6. Quick Commercial Grade Dedication Checklist

Checkmark	Text	Responsible Person
☐	REQUIRED: Have I confirmed that the item or service is commercial grade by definition?	
☐	REQUIRED: Have I confirmed that the item or service will support a nuclear safety function?	
	Prerequisite: If the two questions above are not confirmed, CGD cannot be performed.	
☐	Have I identified the exact application and operating conditions?	
☐	Have I defined the safety function clearly?	
☐	Have responsible organizations, reviewers, and final acceptance authorities been identified?	
☐	Have I created and obtained approval of the CGD plan before verification activities begin?	
☐	Have I completed a technical evaluation that supports and refines the dedication approach?	

☐	Have I identified critical characteristics that are tied to the safety function?	
☐	Have I established objective acceptance criteria?	
☐	Have I selected dedication methods that can verify each characteristic?	
☐	Have I performed verification using controlled processes and qualified personnel?	
☐	Have I documented all results and reviewed them against acceptance criteria?	
☐	Have I completed final acceptance and retained the quality record?	

Key Takeaways

Commercial grade dedication provides documented technical assurance that a commercial item or service is suitable for its intended nuclear application. The dedicating organization must understand the application, identify the attributes necessary to support the safety function, verify those characteristics using appropriate methods, and maintain records that demonstrate the basis for acceptance.

A strong CGD process keeps every decision traceable: safety function to critical characteristic, critical characteristic to acceptance criteria, acceptance criteria to verification method, and verification result to final acceptance.

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Author Information

Laura Suddath is an NQA-1 subject matter expert and quality assurance professional with experience supporting nuclear quality programs, supplier evaluation and audit, Commercial Grade Dedication guidance, technical documentation, and implementation of quality requirements for safety-related work. Laura is a Quality Engineer, Lead Auditor (AS9100 and NQA-1), and Certified Welding Inspector whose work focuses on translating complex nuclear regulatory and code requirements into practical, auditable controls for engineering, procurement, and fabrication activities.

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For information or questions about this article, please contact Laura Suddath at laurasuddath@gmail.com.

For information on audits, training, or other topics related to NQA-1, please contact Greg Johnson at L. Marvin Johnson International at nqa1@cox.net.