ICTQual AB

Qualification Specification

ICTQual AB Level 3 Diploma in Quality Assurance and Quality Control (QA/QC)

ICTQual AB's

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Qualification Specification about

ICTQual AB Level 3 Diploma in Quality Assurance and Quality Control (QA/QC)

About ICTQual AB's

ICTQual AB is a distinguished awarding body based in the United Kingdom, dedicated to fostering excellence in education, training, and skills development. Committed to global standards, ICTQual AB's provides internationally recognized qualifications that empower individuals and organizations to thrive in an increasingly competitive world. Their offerings span diverse industries, including technical fields, health and safety, management, and more, ensuring relevance and adaptability to modern workforce needs.

ICTQual AB's delivers high-quality educational solutions through a network of Approved Training Centres worldwide. Their robust standards and innovative teaching methodologies equip learners with practical knowledge and skills for personal and professional growth. With a mission to inspire lifelong learning and drive positive change, ICTQual AB's continuously evolves its programs to stay ahead of industry trends and technological advancements.

Course Overview

The ICTQual Level 3 Diploma in Quality Assurance and Quality Control (QA/QC) is a comprehensive 60-credit professional qualification. It is strategically structured across eight specialized units to deliver both foundational knowledge and practical, industry-specific expertise in quality management. The program initially builds a strong base in QA/QC fundamentals, international standards, compliance, and essential documentation. Subsequently, it offers advanced specialization in three core engineering disciplines: Civil, Electrical, and Mechanical. This structure ensures graduates possess globally recognized skills tailored for diverse sectors, including construction, oil and gas, manufacturing, and general engineering services. The credit allocation (10 credits for the first four fundamental units and 5 credits for the four remaining specialized units) is designed for a step-by-step progression from general principles to advanced, applied practices.

Aims

The primary aim of this qualification is to develop highly competent QA/QC professionals who can effectively implement, manage, and continuously improve quality management systems within a variety of industrial and

engineering settings to ensure products and services consistently meet global benchmarks and customer requirements.

Objectives

Upon completion of this diploma, learners will be able to:

- **Understand and Apply Core Principles:** Explain and apply the fundamental concepts and best practices of Quality Assurance (QA) and Quality Control (QC).
- **Adhere to Standards and Compliance:** Analyze and implement relevant national and international quality standards (e.g., ISO) and compliance frameworks.
- **Master Inspection Techniques:** Execute various inspection, testing, and monitoring techniques to ensure product/service quality and reliability.
- **Manage Documentation:** Prepare, manage, and audit essential quality documentation, reports, and non-conformance procedures.
- **Contribute to Efficiency:** Develop and implement strategies to enhance operational efficiency, reliability, and overall customer satisfaction through effective quality management.

Targeted Audience

This diploma is ideal for a broad range of individuals seeking to establish or advance their careers in quality management across technical and industrial sectors.

The targeted audience includes:

- **Aspiring QA/QC Professionals:** Individuals with a technical background looking to enter the field of quality assurance and quality control.
- **Engineers and Technicians:** Professionals in Civil, Electrical, and Mechanical engineering fields seeking to specialize in quality management and inspection roles.
- **Industry Professionals:** Current employees in manufacturing, construction, oil and gas, or engineering services who wish to formalize their experience with a recognized qualification.
- **Career Advancers:** Individuals aiming for higher-level positions such as Quality Inspectors, QA/QC Coordinators, or Quality Managers.

Certification Framework

Qualification title	**ICTQual AB Level 3 Diploma in Quality Assurance and Quality Control (QA/QC)**
Course ID	QC0206
Total Qualification Time	600
Guided Learning Hours	300
Grading Type	Pass / Fail
Competency Evaluation	Coursework / Assignments / Verifiable Experience
Assessment	The assessment and verification process for ICTQual AB's qualifications involves two key stages:

Internal Assessment and Verification:
- ✓ Conducted by the staff at the Approved Training Centre (ATC) to ensure learners meet the required standards through continuous assessments.
- ✓ Internal Quality Assurance (IQA) is carried out by the centre's IQA staff to validate the assessment process.

External Quality Assurance:
- ✓ Managed by ICTQual AB's verifiers, who periodically review the centre's assessment and IQA processes.
  Verifies that assessments are conducted to the required standards and ensures consistency across centres

Entry Requirements

To enrol in ICTQual Level 3 Diploma in Quality Assurance and Quality Control (QA/QC), learner must meet the following entry requirements:

- ✓ **Age Requirement:** Learners must be 18 years of age or older at the time of registration.
- ✓ **Educational Background:** Applicants should typically have completed secondary education (Matric/Intermediate or equivalent). A background in science, engineering, or technical studies is helpful but not mandatory
- ✓ **Work Experience:** While fresh learners are welcome, candidates with prior exposure to construction, engineering, manufacturing, or oil and gas industries will find the diploma particularly relevant
- ✓ **English Language Proficiency:** Since the course is delivered in English, learners should have a reasonable command of written and spoken English to understand technical content and complete assessments effectively.

ICTQual AB Level 3 Diploma in Quality Assurance and Quality Control (QA/QC)

Qualification Structure

This qualification comprises 8 mandatory units. Candidates must successfully complete all mandatory units to achieve the qualification.

Mandatory Units	
Unit Ref#	Unit Title
QC0206-01	Principles of Quality Assurance
QC0206-02	Fundamentals of Quality Control
QC0206-03	International Standards and Regulatory Compliance in QA/QC
QC0206-04	Inspection Methodologies and Technical Documentation
QC0206-05	Applied Practices in Quality Assurance and Quality Control
QC0206-06	Quality Control in Civil Engineering Projects
QC0206-07	Quality Control in Electrical Systems and Installations
QC0206-08	Quality Control in Mechanical Engineering Processes

Centre Requirements

To ensure quality training delivery, centres must adhere to the following standards:

1. Centre Approval

✓ Centres must be formally approved by ICTQual AB's before delivering this qualification.

✓ Approval involves a review of facilities, policies, and staff qualifications.

2. Qualified Staff

✓ **Tutors:** Must hold a Level 5 or higher qualification (e.g., Higher National Diploma, Bachelor's degree, or equivalent) in Quality Assurance (QA/QC), Engineering (Civil, Electrical, Mechanical), Industrial Management, Manufacturing Technology, or a closely related technical field.

✓ **Assessors:** Must hold a recognized assessor qualification (e.g., CAVA, AVRA) or equivalent)

✓ **Internal Quality Assurers (IQAs):** Must hold a recognized IQA qualification (e.g. Level 4 Award in the IQA and Level 4 Certificate in Leading the IQA) and experience to oversee assessment standards.

3. Learning Facilities

Centre must offer:

✓ Private study areas and internet-enabled workspaces (for blended or physical delivery)

✓ Academic and pastoral support for learners

✓ Administrative support must be available to manage enrolment, tracking, and learner queries efficiently

4. Health and Safety Compliance

✓ All training facilities must comply with health and safety regulations.

✓ Centres must conduct regular risk assessments for practical activities.

5. Learning Resources

- ✓ **Course Materials:** Approved textbooks, study guides, and digital content must align with the qualification standards.

- ✓ **Assessment Tools:** Templates and guidelines must be provided to ensure standardized evaluation processes.

- ✓ **E-Learning Support:** Centres offering online or blended learning must implement an effective Learning Management System (LMS).

6. Assessment and Quality Assurance

- ✓ Centres must ensure assessments meet ICTQual AB's competency standards.

- ✓ Internal quality assurance (IQA) must be conducted to maintain consistency.

- ✓ External verifiers from ICTQual AB's will review assessment and training practices.

7. Learning Support

- ✓ **Qualification Guidance:** Support for coursework and assignments.
- ✓ **Career Pathway Assistance:** Information on progression opportunities in sustainability and energy sectors.
- ✓ **Accessibility Support:** Accommodations for learners with disabilities or language barriers.

8. Policies and Compliance

Centres must uphold the following policies in accordance with ICTQual AB's standards:

- ✓ Equality, Diversity, and Inclusion Policy.

- ✓ Health and Safety Policy.

- ✓ Safeguarding and Learner Protection Policy.

- ✓ Complaints and Appeals Procedure.

- ✓ Data Protection and Confidentiality Policy.

9. Reporting Requirements

- Centres must provide ICTQual AB's with regular reports on learner registrations, progress, and certification outcomes.

- Assessment records must be maintained for external auditing and quality assurance purposes.

Support for Candidates

Centres should ensure that materials developed to support candidates:

- ✓ Facilitate tracking of achievements as candidate's progress through the learning outcomes and assessment criteria.
- ✓ Include information on how and where ICTQual AB's policies and procedures can be accessed.
- ✓ Provide mechanisms for Internal and External Quality Assurance staff to verify and authenticate evidence effectively.

This approach ensures transparency, supports candidates' learning journeys, and upholds quality assurance standards.

Assessment

This qualification is competence-based, requiring candidates to demonstrate proficiency as defined in the qualification units. The assessment evaluates the candidate's skills, knowledge, and understanding against the set standards. Key details include:

1. **Assessment Process:**

   - ✓ Must be conducted by an experienced and qualified assessor.
   - ✓ Candidates compile a portfolio of evidence that satisfies all learning outcomes and assessment criteria for each unit.

2. **Types of Evidence:**

   - ✓ Observation reports by the assessor.
   - ✓ Assignments, projects, or reports.
   - ✓ Professional discussions.
   - ✓ Witness testimonies.
   - ✓ Candidate-produced work.
   - ✓ Worksheets.
   - ✓ Records of oral and written questioning.
   - ✓ Recognition of Prior Learning (RPL).

3. **Learning Outcomes and Assessment Criteria:**

   - ✓ **Learning Outcomes:** Define what candidates should know, understand, or accomplish upon completing the unit.
   - ✓ **Assessment Criteria:** Detail the standards candidates must meet to demonstrate that the learning outcomes have been achieved.

This framework ensures rigorous and consistent evaluation of candidates' competence in line with the qualification's objectives.

Unit Descriptors

QC0206-01- Principles of Quality Assurance

This unit establishes the core concepts, philosophies, and evolution of Quality Assurance (QA). Learners will explore the importance of QA in business operations, focusing on processes, planning, systems documentation, and implementing preventive measures to achieve consistent quality. Key topics include quality management systems, continuous improvement models, and the relationship between QA and organizational objectives.

Learning Outcome:	Assessment Criteria:
1. Understand the fundamental concepts and philosophy of quality assurance in industrial contexts.	1.1 Explain the core difference between Quality Assurance (QA) and Quality Control (QC) using an industry example. 1.2 Define the three main costs of quality (prevention, appraisal, and failure). 1.3 Describe the proactive philosophy of QA and its main benefit for a business. 1.4 Identify and briefly describe the role of at least four major historical or current quality pioneers (e.g., Deming, Juran, Crosby).
2. Explain the role of QA in ensuring product and service reliability.	2.1 Describe how process checks implemented by QA directly contribute to a final product's reliability. 2.2 Explain the relationship between QA procedures and the prevention of product failures. 2.3 Provide an example of a service industry (not manufacturing) and detail how QA measures maintain service consistency.
3. Identify key responsibilities of quality assurance professionals across industries.	3.1 List the three main categories of tasks a QA professional performs (e.g., auditing, documentation, training). 3.2 Describe the QA professional's responsibility in maintaining the Quality Management System (QMS). 3.3 Explain the QA role in supplier qualification and monitoring for an incoming material. 3.4 State the primary responsibility of a QA professional when a major quality issue is discovered.
4. Apply QA frameworks to improve organizational efficiency and customer satisfaction.	4.1 Select a common QA framework (e.g., Total Quality Management (TQM)) and explain two key steps for its implementation. 4.2 Propose a specific QA process change that would directly reduce operational waste in a given scenario. 4.3 Explain how a well-designed QA process helps to meet

or exceed stated customer requirements.

5.	**Evaluate the impact of QA on compliance with international standards.**	5.1	Explain why adherence to a standard like ISO 9001 is important for global business operations.
		5.2	Describe the function and importance of a QA audit in verifying compliance with an external standard.
		5.3	Provide an example of a potential non-compliance situation and evaluate its potential impact on an organization's legal standing.
		5.4	Interpret a small section of an ISO standard to determine its requirement for a specific QA document.
6.	**Develop strategies for continuous improvement through QA systems.**	6.1	Explain the steps of the PDCA cycle (Plan, Do, Check, Act) and relate it to continuous improvement.
		6.2	Develop a brief strategy using the root cause analysis method to address a repetitive product defect.
		6.3	Identify a key performance indicator (KPI) for a QA department and explain how tracking it supports improvement.
7.	**Demonstrate awareness of ethical and professional practices in quality assurance.**	7.1	Explain the ethical responsibility of a QA professional when faced with pressure to approve substandard work.
		7.2	Describe the professional need for impartiality and objectivity during quality audits.
		7.3	Outline the importance of confidentiality when dealing with sensitive quality audit findings.
		7.4	Identify a conflict of interest scenario in QA and propose a way to manage it ethically.
8.	**Relate QA principles to real‑world case studies and industry applications.**	8.1	Summarize the key QA principles demonstrated in a provided case study of a major product recall.
		8.2	Select two different industries (e.g., food production and construction) and describe a unique QA challenge in each.
		8.3	Analyze a simple scenario and recommend the most relevant QA principle to apply for preventing future issues.

QC0206-02- Fundamentals of Quality Control

This unit introduces the essential techniques and tools for Quality Control (QC). It covers the methods used for product inspection, testing, sampling procedures, and defect identification. Learners will study basic statistical process control (SPC) tools, measuring equipment calibration, non-conformance reporting, and corrective actions necessary to ensure final product or service specifications are met.

Learning Outcome:	Assessment Criteria:
1. **Define the scope and objectives of quality control in engineering and manufacturing.**	1.1 Define the scope of Quality Control (QC), stating where its checks occur in the production process. 1.2 Identify the primary objective of QC regarding product specifications and tolerance limits. 1.3 Explain how QC activities contribute to uniformity in manufactured goods.
2. **Differentiate between preventive and corrective QC measures.**	2.1 Explain the timing difference between preventive and corrective measures in a production cycle. 2.2 Classify a tool calibration program as either preventive or corrective and justify the choice. 2.3 Provide a clear example of a corrective QC action taken after a batch of parts fails inspection. 2.4 Describe how preventive measures aim to reduce the need for later corrective actions.
3. **Apply statistical tools and sampling techniques for quality inspection.**	3.1 Explain the concept of Acceptance Sampling and when it would be used instead of 100% inspection. 3.2 Calculate the mean and range for a small set of inspection measurements. 3.3 Identify the appropriate type of control chart (e.g., X-bar and R) for tracking a specific measured characteristic over time.
4. **Recognize the importance of defect detection and corrective action.**	4.1 Describe the immediate actions taken upon detecting a non-conforming part on the production line. 4.2 Explain why isolating and identifying the source of a defect is critical before proceeding with the production batch. 4.3 Detail the difference between rework and scrap for a defective product. 4.4 State the role of QC documentation in supporting a later corrective action plan.
5. **Implement QC procedures to maintain product consistency.**	5.1 Outline the steps for a standard QC check on a finished product, including the required tools. 5.2 Explain how calibrated measuring equipment

ensures the reliability of QC procedures.

5.3 Develop a simple pass/fail checklist based on product specifications for a specific component.

6. Assess the role of QC in reducing waste and optimizing resources.	6.1 Explain how early detection of defects saves resources compared to detection at the final stage. 6.2 Provide an example of a resource (e.g., material, labor, time) that is conserved by effective QC. 6.3 Assess how tracking rejection rates helps management optimize resource allocation. 6.4 Describe how optimized sampling plans can reduce the time spent on inspection without compromising quality.
7. Interpret QC data to support decision‑making processes.	7.1 Interpret a simple Pareto chart to identify the most frequent cause of defects. 7.2 Explain what a data point outside the control limits on a control chart signifies to a QC technician. 7.3 Summarize the findings from a set of QC inspection data to recommend whether a batch should be accepted or rejected.
8. Integrate QC practices into organizational quality management systems.	8.1 Explain where QC documentation (like inspection logs) fits within the overall structure of a QMS. 8.2 Describe how the data generated by QC processes serves as input for the QA department's continuous improvement efforts. 8.3 Identify a specific clause or section in a QMS standard (like ISO 9001) that requires systematic QC practices. 8.4 Explain the process for handling and documenting non-conforming material within the QMS structure.

QC0206-03- International Standards and Regulatory Compliance in QA/QC

This unit examines the critical role of international quality standards and regulatory frameworks, particularly the ISO 9001 family. Learners will investigate compliance requirements, auditing processes, certification, and the legal and ethical responsibilities of QA/QC professionals in global trade. The focus is on implementing and maintaining documented systems that meet mandatory industry-specific regulations.

Learning Outcome:	Assessment Criteria:
1. **Identify key international standards such as ISO, ASTM, and ASME.**	1.1 Identify the full names for ISO, ASTM, and ASME and state the general scope of each organization. 1.2 Describe the primary focus of the ISO 9000 family of standards. 1.3 Differentiate between a material standard (like ASTM) and a system standard (like ISO).
2. **Explain the importance of regulatory compliance in global industries.**	2.1 Explain how regulatory compliance protects the end-user or consumer from harm. 2.2 Describe the financial consequence (e.g., fines, legal costs) of failing to comply with a major safety regulation. 2.3 Justify why compliance is necessary for accessing international markets and trading globally. 2.4 Provide an example of a mandatory regulation (not a voluntary standard) that affects a specific industry.
3. **Apply standardization principles to QA/QC processes.**	3.1 Explain how using a standardized inspection checklist improves consistency across different QC inspectors. 3.2 Describe how a standard's requirement for training and competency is implemented in a QA/QC department. 3.3 Develop a simple procedure for labeling and controlling documents based on a standardization principle.
4. **Evaluate the impact of non‑compliance on organizational reputation and safety.**	4.1 Evaluate the short-term and long-term impact of a major non-compliance event on a company's brand reputation. 4.2 Describe a scenario where non-compliance with a safety standard directly leads to an occupational hazard. 4.3 Explain how media coverage of a non-compliant product recall can affect investor confidence.

4.4 Analyze a non-compliance report and recommend an appropriate immediate corrective action to mitigate safety risks.

5. Interpret certification requirements for QA/QC professionals.

5.1 Identify the three main components typically required for professional certification (e.g., experience, exam, ethics).

5.2 Explain the benefit of professional certification to a Level 3 QA/QC technician's career progression.

5.3 Interpret a sample requirement from a certification body regarding the continuing education needed to maintain a qualification.

6. Develop awareness of sector‑specific compliance frameworks (construction, oil & gas, pharma).

6.1 Identify a critical regulatory body for one of the listed sectors (construction, oil & gas, or pharma).

6.2 Describe a unique quality risk present in the oil & gas sector that requires specific compliance measures.

6.3 Explain the concept of Good Manufacturing Practice (GMP) and its relevance to the pharmaceutical sector.

6.4 Provide an example of a document or log that is legally required only in the construction sector.

7. Relate standards to risk management and quality audits.

7.1 Explain how the requirements of a standard (e.g., ISO) help an organization identify and manage quality risks.

7.2 Describe the main objective of a compliance audit compared to a general process audit.

7.3 Give an example of how a standard dictates the documentation required to demonstrate risk mitigation.

8. Demonstrate knowledge of documentation required for compliance verification.

8.1 List four specific types of records or documents commonly required during a compliance audit.

8.2 Explain the importance of a document revision history for maintaining compliance.

8.3 Describe the procedure for ensuring that the latest version of a standard or regulation is always used in QA/QC activities.

8.4 State the required retention period for a critical quality record based on a simple regulatory guideline.

QC0206-04- Inspection Methodologies and Technical Documentation

This unit focuses on practical inspection methodologies and the creation of technical documentation. It covers various types of inspections (visual, dimensional, NDT), interpreting engineering drawings, and managing inspection records, test reports, and data sheets. Learners develop skills in preparing quality plans, checklists, and handover packages for transparent quality verification and traceability.

Learning Outcome:	Assessment Criteria:
1. Understand the role of inspection in QA/QC systems.	1.1 Define the primary purpose of inspection within the overall Quality Management System. 1.2 Differentiate between the timing of a pre-inspection and a final inspection in a project lifecycle. 1.3 Explain how the results of an inspection serve as a feedback loop for process improvement.
2. Apply different inspection techniques for civil, electrical, and mechanical projects.	2.1 Describe a suitable Non-Destructive Testing (NDT) method (e.g., Visual, Ultrasonic) for inspecting a welded mechanical joint. 2.2 Outline the process for conducting a simple insulation resistance test on an electrical cable. 2.3 Describe the steps for a visual inspection of a structural concrete pour on a civil project. 2.4 Identify the correct measurement tool (e.g., micrometer, vernier caliper, multimeter) for a specific inspection task in each of the three fields.
3. Recognize the importance of accurate technical documentation.	3.1 Explain why legibility and accuracy in inspection reports are crucial for legal and warranty purposes. 3.2 Describe the consequence of missing or incomplete technical documentation during a project handover. 3.3 State the importance of using standardized terminology and symbols in technical drawings and documents.
4. Prepare inspection reports that meet industry standards.	4.1 List the five main sections that must be included in a professional inspection report. 4.2 Complete a sample non-conformance report (NCR) detailing a discovered defect, including required signatures. 4.3 Draft the objective and scope section for a given project inspection.

4.4 Ensure that all measurements in the report are correctly recorded with units and within specified tolerance limits.

5. Evaluate inspection outcomes to recommend corrective actions.

5.1 Analyze an inspection report showing a measurement outside the tolerance range and recommend one of three dispositions (e.g., Accept by Concession, Rework, Reject).

5.2 Determine the root cause of a repetitive visual defect based on a series of inspection observations.

5.3 Formulate a clear, actionable corrective action recommendation for a non-conformance.

6. Use checklists and templates for systematic inspections.

6.1 Explain the main benefit of using a standardized checklist in a complex, multi-stage inspection.

6.2 Identify a potential risk associated with relying too heavily on a generic inspection checklist.

6.3 Complete a section of a Project Quality Plan (PQP) checklist for a specific work phase.

6.4 Describe how a checklist helps to ensure regulatory requirements are not missed during the inspection process.

7. Integrate inspection data into quality management systems.

7.1 Explain the process for transferring raw inspection data (e.g., from paper log) into a digital QMS database.

7.2 Describe how QC inspection results contribute to the management review process of the QMS.

7.3 Identify how the frequency of inspections is determined and documented within the QMS plan.

8. Demonstrate professional communication through technical documentation.

8.1 Write a professional and concise email summary to a project manager detailing the main findings of an inspection report.

8.2 Explain the importance of using neutral and factual language when describing a defect in documentation.

8.3 Use appropriate technical jargon correctly to describe a specific inspection finding (e.g., "pitting corrosion," "undercut").

8.4 Draft a short "Lessons Learned" entry based on a difficult inspection outcome for future reference.

QC0206-05- Applied Practices in Quality Assurance and Quality Control

This unit integrates the principles of QA and QC through practical application. Learners analyze real-world case studies to develop effective quality management plans, risk assessments, and supplier quality evaluation methods. It focuses on the deployment of both preventive (QA) and detection (QC) measures to optimize processes, reduce waste, and enhance customer satisfaction in a typical project lifecycle.

Learning Outcome:	Assessment Criteria:
1. Apply QA/QC principles to real‑world industrial projects.	1.1 Identify where QA activities (e.g., auditing) and QC activities (e.g., inspection) would take place on a provided project timeline. 1.2 Select an industrial project and propose an appropriate QC hold point and a witness point in the workflow. 1.3 Explain how the principle of 'first-time quality' is applied to a specific industrial task. 1.4 Develop a brief flowchart showing the steps for managing non-conforming material on a project site.
2. Demonstrate practical skills in inspection, testing, and reporting.	2.1 Given a set of component specifications, select and justify the most suitable measurement tool and testing method. 2.2 Simulate the steps for conducting a basic dimensional inspection using a standard measuring device. 2.3 Generate an inspection observation entry clearly detailing a finding, reference standard, and location.
3. Integrate QA/QC practices into project management frameworks.	3.1 Explain how QA/QC planning must be integrated with the project's time schedule and budget. 3.2 Describe the role of the QA/QC team in the project's kick-off meeting and initial planning phase. 3.3 Identify three examples of project risks that are specifically mitigated through QA/QC procedures. 3.4 Explain how a Quality Plan acts as a contractual document within the project management framework.
4. Evaluate case studies to identify best practices in QA/QC.	4.1 Analyze a case study about a successful project and identify the two most effective QA/QC best

practices used.

4.2 Compare a failed project case study with a successful project case study to highlight the impact of poor QC.

4.3 Extract a transferable "Lesson Learned" from a complex project case study to apply to a new, simpler project.

5. **Implement corrective and preventive actions in workplace scenarios.**

5.1 Develop a formal Corrective Action Request (CAR) based on a recurring audit finding.

5.2 Propose a Preventive Action designed to eliminate the root cause of a specific non-conformance.

5.3 Explain the procedure for verifying the effectiveness of an implemented corrective action.

5.4 Outline the difference between correction (fixing the defect) and corrective action (fixing the cause).

6. **Use QA/QC tools to enhance safety and reliability.**

6.1 Describe how a QC tool like a Control Chart can be used to monitor and maintain the reliability of equipment over time.

6.2 Explain how pre-job safety checklists and risk assessments are a form of applied QA.

6.3 Identify a quality failure mode (e.g., fatigue failure) and explain how a specific QA/QC check prevents it, improving safety.

7. **Collaborate effectively with multidisciplinary teams in QA/QC projects.**

7.1 Describe the necessary information exchange between the QA/QC department and the Design/Engineering team.

7.2 Explain the importance of clear communication when addressing a non-conformance with the Production/Construction crew.

7.3 Outline the procedure for a joint site walkdown or inspection involving QC, Safety, and the Project Manager.

7.4 Identify a potential communication barrier between QA/QC and another department (e.g., Procurement) and suggest a solution.

8. **Reflect on professional growth through applied QA/QC practices.**

8.1 Document a specific instance of a challenging QC inspection and detail the personal judgment used to resolve it.

8.2 Set two measurable goals for professional

development based on a review of recent QA/QC project performance.

8.3 Reflect on how a recent project experience has increased understanding of the autonomy and responsibility.

QC0206-06- Quality Control in Civil Engineering Projects

This specialization unit details the QC procedures specific to the Civil Engineering sector. It covers the inspection and testing of construction materials (concrete, steel, soil), site-specific quality planning, earthwork quality, and adherence to relevant building codes and civil standards. Focus is placed on critical inspection points and documentation for large-scale infrastructure projects.

Learning Outcome:	Assessment Criteria:
1. Apply QC principles to construction materials and site inspections.	1.1 Explain the process of material verification (checking materials against specifications) upon their arrival at the construction site.
	1.2 Describe the steps for conducting a pre-pour inspection of formwork and reinforcement.
	1.3 List three common non-conforming issues that would be checked for during a site inspection walk-through.
2. Evaluate concrete, steel, and other civil materials for compliance.	2.1 Explain the purpose of taking concrete test cylinders and the standard timeframes for testing their strength.
	2.2 Describe the QC checks required for rebar (reinforcement steel) before it is placed, referencing standards for size and bend.
	2.3 Evaluate a soil compaction test report to determine if the result meets the required density standard.
	2.4 Identify a key QC check for asphalt or aggregate materials used in road construction.
3. Recognize common defects in civil engineering projects.	3.1 Identify and briefly describe three common defects found in fresh or hardened concrete (e.g., honeycombing, spalling, cracking).
	3.2 Explain the cause of misalignment in structural steel and the QC check that prevents it.
	3.3 Describe a common defect found in welding (e.g., undercut, porosity) and how it is detected visually.
4. Implement QC procedures for structural safety and durability.	4.1 Outline the QC procedure for verifying the correct cover of concrete over reinforcement steel.
	4.2 Explain the importance of checking the level and plumb of structural elements (e.g., columns, beams).
	4.3 Describe the QC check used to ensure proper bolt torque in structural steel connections.

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4.4 Develop a simple procedure for the curing of concrete to ensure its long-term durability.

5. **Prepare documentation for civil QC inspections.**	5.1 Complete a sample Request for Inspection (RFI) form for a civil work segment.
	5.2 List the required attachments for a civil Material Receiving Report (MRR).
	5.3 Prepare an entry for a Daily QC Log detailing the activities, inspection results, and weather conditions.
6. **Relate QC practices to international civil engineering standards.**	6.1 Identify a relevant ASTM standard that dictates the testing method for concrete compressive strength.
	6.2 Explain how a civil QC inspector ensures that the work complies with the project's design drawings and specifications.
	6.3 Describe the significance of drawing revisions in maintaining compliance with civil standards.
	6.4 Provide an example of how a standard specifies the sampling size for a batch of construction material.
7. **Assess the impact of QC on project timelines and costs.**	7.1 Assess the impact of a major QC failure (e.g., having to demolish and re-pour concrete) on the project's schedule and budget.
	7.2 Explain how the process of QC hold points prevents costly rework later in the project.
	7.3 Identify a QC activity that, while adding time initially, saves overall project time by preventing delays.
8. **Demonstrate awareness of safety and environmental considerations in civil QC.**	8.1 Explain the QC responsibility regarding the proper disposal of construction waste to meet environmental compliance.
	8.2 Describe how QC verifies that safety-critical installations (e.g., guardrails, scaffolding foundation) meet specifications.
	8.3 Identify a hazard related to a specific QC test (e.g., concrete slump test) and the safety precaution required.
	8.4 Explain the environmental need to check for erosion control measures during a civil site inspection.

QC0206-07- Quality Control in Electrical Systems and Installations

This unit is dedicated to QC within Electrical Engineering. It covers inspection and testing protocols for wiring, grounding, power distribution, control panels, and safety systems. Learners will study relevant electrical codes, commissioning procedures, certification requirements, and the use of specialized testing equipment to ensure installation quality, functionality, and compliance with safety regulations.

Learning Outcome:	Assessment Criteria:
1. **Apply QC principles to electrical systems and installations.**	1.1 Explain the concept of Systematic QC when inspecting a complex electrical panel installation. 1.2 Describe the importance of checking vendor data and certifications for electrical components before installation. 1.3 Identify the QC objective when inspecting cable routing and support systems.
2. **Conduct inspections of wiring, circuits, and electrical equipment.**	2.1 Outline the procedure for a visual inspection of wiring terminations inside a junction box. 2.2 Describe the QC check for proper wire sizing and color coding against the design specifications. 2.3 Identify the correct QC check for the torque applied to high-current bolted electrical connections. 2.4 Explain the importance of checking the correct rating and labeling of circuit breakers.
3. **Recognize safety hazards and compliance issues in electrical projects.**	3.1 Identify three common safety hazards that an electrical QC inspector must look for (e.g., exposed live parts, incorrect grounding, frayed insulation). 3.2 Describe the compliance issue resulting from improperly sized grounding conductors. 3.3 Explain the consequence of non-compliance with national electrical safety codes on insurance and liability.
4. **Implement testing procedures for electrical reliability.**	4.1 Outline the procedure for conducting a Continuity Test on a cable run and what a failing result indicates. 4.2 Explain the purpose of a Polarity Check on an electrical outlet. 4.3 Describe the function and application of a Ground Resistance Test. 4.4 Identify the main steps for conducting a basic

Functional Test on a newly installed motor or pump control circuit.

5. Prepare technical documentation for electrical QC inspections.

5.1 Complete a sample QC Checklist for a final electrical installation, including voltage and current readings.

5.2 List the required documentation (e.g., test certificates, calibration records) to be attached to an Electrical Inspection Report.

5.3 Record an observation of a non-conforming wire splice using accurate electrical terminology.

6. Relate QC practices to international electrical standards.

6.1 Identify a major international or national electrical safety code/standard (e.g., IEC, NEC) and its primary purpose.

6.2 Explain how an electrical QC inspector uses design drawings that reference standard symbols to ensure compliance.

6.3 Describe the QC check to ensure a component's Ingress Protection (IP) rating is suitable for the installation environment.

6.4 Relate a specific standard requirement to the QC check on cable tray fill ratios.

7. Evaluate the role of QC in preventing electrical failures.

7.1 Explain how QC checks on loose connections directly prevent overheating and potential fire hazards.

7.2 Describe how early detection of insulation damage by QC prevents future short circuits and equipment damage.

7.3 Assess a scenario where a systematic QC failure leads to a widespread electrical outage and recommend a preventive action.

8. Demonstrate awareness of occupational safety in electrical QC.

8.1 List the three main items of Personal Protective Equipment (PPE) required for most electrical testing/inspections.

8.2 Describe the Lockout/Tagout (LOTO) procedure and its importance for QC inspectors working on live systems.

8.3 Explain the concept of a "Safe Working Distance" and why it is critical during live electrical inspection.

8.4 State the importance of checking the calibration sticker on test equipment (e.g., multimeter)

before use.

QC0206-08- Quality Control in Mechanical Engineering Processes

This specialization unit focuses on QC in Mechanical Engineering. Topics include the inspection of fabricated components, welding procedures, pressure equipment, piping systems, and mechanical assembly. Learners study dimensional tolerance checks, material verification, equipment calibration, and non-destructive testing (NDT) methods essential for manufacturing and heavy industrial applications.

Learning Outcome:	Assessment Criteria:
1. **Apply QC principles to mechanical systems and processes.**	1.1 Describe how the QC process verifies the dimensional accuracy of a machined part against its engineering drawing. 1.2 Explain the importance of checking the Material Test Certificates (MTCs) for all critical raw materials used. 1.3 Identify a key QC check during the assembly process of a mechanical system (e.g., checking alignment).
2. **Inspect mechanical components for defects and compliance.**	2.1 Outline the procedure for a Visual Inspection of a completed weld joint, looking for surface defects. 2.2 Describe how a Vernier Caliper or Micrometer is used to check the tolerance of a shaft diameter. 2.3 Identify a Non-Destructive Testing (NDT) technique (e.g., Penetrant Testing, Magnetic Particle Inspection) suitable for detecting surface cracks. 2.4 Explain the QC check to verify the surface finish (roughness) of a mechanical component.
3. **Implement calibration procedures for mechanical equipment.**	3.1 Explain the difference between internal and external calibration of measuring instruments. 3.2 Describe the process for checking the validity and status of the calibration sticker on a torque wrench. 3.3 Explain the consequence of using an uncalibrated measuring instrument during a critical QC inspection.
4. **Recognize common mechanical failures and corrective actions.**	4.1 Identify and describe the QC detection of a common failure mode such as excessive vibration in rotating equipment. 4.2 Describe the difference between erosion and corrosion and how QC identifies each. 4.3 Provide an example of an immediate corrective action upon discovering a leaking pipe flange

during a test.

4.4 Explain how a "Final Dimensional Check" prevents assembly interference issues.

5. Prepare documentation for mechanical QC inspections.	5.1 Complete a sample Dimensional Inspection Report for a part, clearly stating the nominal, tolerance, and actual measurement.
	5.2 List the required fields on a Weld Visual Inspection Report.
	5.3 Record a non-conformance for a mechanical component that has an incorrect material grade specified on the MTC.
6. Relate QC practices to international mechanical engineering standards.	6.1 Identify a key ASME code or standard (e.g., ASME B31.3) relevant to piping systems and its importance for QC.
	6.2 Explain how QC ensures compliance with a standard's requirement for minimum wall thickness in pressure vessels.
	6.3 Describe the importance of checking the Welding Procedure Specification (WPS) against the actual weld process.
	6.4 Relate a standard's requirement for cleanliness to the QC inspection of internal pipeline surfaces.
7. Evaluate the impact of QC on mechanical system efficiency.	7.1 Explain how QC checks on pump or motor alignment directly influence the equipment's energy efficiency.
	7.2 Describe how the QC check for proper lubrication ensures long-term operational efficiency and reduces wear.
	7.3 Assess a QC report showing poor welding quality and explain its long-term impact on the pressure integrity and efficiency of a fluid system.
8. Demonstrate awareness of safety and reliability in mechanical QC.	8.1 Explain the importance of checking the pressure relief valve settings during a mechanical system inspection.
	8.2 Describe the QC role in verifying the correct installation of safety guards on moving machinery.
	8.3 Identify the safety hazard associated with over-torqued or under-torqued bolts in critical assemblies.

8.4 Explain the purpose of a Hydrostatic Test and its role in ensuring the safety and reliability of a piping system.

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