PERFORM PROCESS QUALITY CONTROL

UNIT CODE: ENG/OS/CE/CR/2/6

UNIT DESCRIPTION

This unit covers the knowledge, understanding and skills required for a Chemical Engineering Technician to perform Quality Control Procedures in a workplace where chemical production activities are performed. It includes implementing of quality management systems, conducting materials and equipment inspection, performing Process parameters adjustments, quarantining non-conformities, carrying out root cause analysis and performing process statistical analysis.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range***
1. Develop/identify process QC standards	1.1 Check the availability of process QC standard according to SOP. 1.2 Research on the QC process according to SOP 1.3 Determine methodology for QC standard according to SOP 1.4 Develop process QC standard according to Quality management system (QMS) 1.5 Obtain approval of developed QC standards according SOP 1.6 Install approved QC standard according to SOP
2. Train staff and sensitize stakeholders for quality management systems	2.1 Process members are trained on how to implement quality management systems according to QMS 2.2 Staff are trained on why to implement quality management according to QMS. 2.3 Stakeholders are sensitized on importance of QMS according to QMS standards. 2.4 Process members are trained on the usage of ***quality documents*** according to quality standards. 2.5 Process members are trained on participation and supporting quality audit according to **quality standards.** 2.6 Process members are trained on how to deliver

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	quality work on time according to Quality Standards
3. Inspect incoming materials and consumables	2.1 ***Materials*** and products are inspected as per ***production data*** according to Quality Standards 2.2 Materials and products are checked at regular intervals according to the quality standards 2.3 Any variance in materials are recorded and escalated according to the quality standards.
4. Collect samples (Incoming materials, in process materials & finished product).	3.1 Sample materials & products are tested according to ***Standard Operating Procedures (SOP)*** 3.2 Samples are identified according to SOP 3.3 Reference samples are stored for future/further testing according to SOP 3.4 ***Equipment for testing*** is identified according to SOP 3.5 Tests are carried out according to SOP 3.6 Data is maintained according to SOP
5. Verify equipment functionality	4.1 Equipment is tested to carry out optimum production activities according to SOP 4.2 Process equipment is monitored and parameters recorded to obtain optimal performance according to SOP 4.3 Preventive maintenance is coordinated with maintenance teams according to SOP
6. Perform Process parameters adjustments	5.1 ***Critical parameters*** for the ***utilities*** are set according to the s SOP 5.2 Critical parameters for the ***production machines*** are set according to the SOP 5.3 ***Process parameters*** are adjusted according to the SOP
7. Analyze collected samples	6.1 Obtain collected data according to SOP 6.2 Clean raw data according to SOP 6.3 Obtain tools for analysis according to SOP 6.4 Analyze data according to SOP 6.5 Report data according to requirement.
8. Maintain analyzed samples records.	7.1 Obtain analysed records 7.2 File records 7.3 Store records

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9. Identify non-conforming products	8.1 Obtain data from quality control according to SOP 8.2 Segregate non-conforming products according to SOP 8.3 Label non-conforming products according to quality standards. 8.4 Document non-conforming products according to SOP.
10. Quarantine non-conforming products.	10.1 Non-conformities are identified and removed from the process flow according to Quality Standards 10.2 Non-conformities are labelled and stored in a secure area according to the quality standards 10.3 Non-conformities are recorded and reported according to Quality Standards 10.4 Release the finished products according to quality standards
11. Carry out non-conformities root cause analysis.	11.1 Problems are defined according to ***root cause analysis techniques*** 11.2 The information is checked to understand the problem according to root cause analysis technique 11.3 Immediate action is implemented to solve the problem according to root cause analysis technique 11.4 Corrective action is determined to solve the problem according to root cause analysis technique 11.5 The solution for the problem is confirmed and recorded according to quality standards
12. Release finished products.	12.1 Verify the products according to SOP 12.2 Record products according to company policy 12.3 Obtain approval according to SOP 12.4 Release records according to SOP
13. Perform process statistical analysis.	13.1 Data is collected from the process according SOP's 13.2 Data from the process is analysed according to

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	SOP's 13.3 Data from the process is reported according to SOP's

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Quality Standards include but not limited to:	1.1 Customer specifications 1.2 ISO 9000 1.3 ISO 9001 1.4 ISO 17025
2. Quality Documents include but not limited to:	2.1 The quality objectives 2.2 Process description documentation 2.3 Resources and facilities required 2.4 Verification and validation, monitoring, inspection/test plans and criteria for acceptance 2.5 Records for demonstrating confidence of conformity of processes 2.6 Organization instructions
3. Production data include but not limited to:	3.1 Name. 3.2 Quality 3.3 Quantity 3.4 Production date 3.5 Expiry date
4. Standard Operating Procedures (SOP) include but not limited to:	4.1 Sampling instructions. 4.2 Operation manuals. 4.3 Testing procedures 4.4 Data record format. 4.5 Inspection report. 4.6 Nonconformities report. 4.7 Company Instructions. 4.8 Packaging specification.
5. Testing Equipment include but not limited to:	5.1 Spectroscopy systems, such as MS, atomic absorption, atomic emission, Ultra Violet, X-ray, and Raman

Variable	Range
	spectroscopy 5.2 Gas chromatography and liquid chromatography systems 5.3 Process analysers including refractometers, rheometers, viscometers, thermal analysers, and calorimeters.
6. Critical process parameters include but not limited to:	6.1 Temperature 6.2 Pressure. 6.3 Catalysis 6.4 Rotation speed 6.5 PH. 6.6 Agitation 6.7 Cooling rate 6.8 Flow rates 6.9 Levels 6.10 Viscosity 6.11 Vibrations
7. Equipment/Production machines include but not limited to:	7.1 Reactor 7.2 Filters 7.3 Driers 7.4 Separators 7.5 Heat exchangers 7.6 Pumps 7.7 Variable speed drives 7.8 Safety equipment 7.9 Conveyer belts. 7.10 Date code machine. 7.11 Packaging machine 7.12 Diagnostic equipment. 7.13 Testing equipment. 7.14 Labelling machine.
8. Utilities include but not limited to:	8.1 Compressed air. 8.2 Inert Gas. 8.3 Fuel. 8.4 Water (Process water, Potable water, Cooling water, Hot water, Boiler feed water, Fire water, and Waste water) 8.5 Steam (wet/ dry/superheated). 8.6 Electricity. 8.7 Natural gas. 8.8 Manufactured gas

Variable	Range
	8.9 Refrigerants. 8.10 Thermal Fluids.
9. Root cause analysis techniques include but not limited to:	9.1 5 Ws (What, why, when, where, who) 9.2 Fish bone diagram 9.3 Cause effect diagram
10. Materials include but not limited to:	10.1 Raw materials 10.2 In process materials 10.3 Packaging materials 10.4 Process consumable materials 10.5 Process waste 10.6 Catalysts

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Organizational Context (Knowledge of the Company/Organization and its processes) **The individual on the job needs to know and understand:**	
1.1	Company's policies on health, safety and environmental procedures at the workplace
1.2	Standard operating procedures of the production unit
1.3	Policies and procedures for conducting/participating in audits
1.4	Legal and regulatory frameworks relevant to the production work
1.5	Quality assurance methods approved by the company
1.6	Escalation protocol for reporting identified issues during quality checks.
1.7	Documentation
2. Technical Knowledge **The individual on the job needs to know and understand:**	
2.1	Different quality management systems (ISO-9000, ISO-14001, OHSAS-18000)
2.2	Materials inspection procedures
2.3	Different techniques/inspection methods used to identify defects
2.4	Standard method of sampling and testing
2.5	Use of testing instruments
2.6	Diagnoses of production line equipment
2.7	Diagnoses of testing instruments
2.8	Maintaining master samples
2.9	Confirming status of plant/equipment
2.10	Preventive maintenance

2.11	Adjustment of parameters for the utilities & production machine
2.12	Identification and isolation of non-conformities
2.13	Root cause analysis.
2.14	Statistical analysis.
2.15	Composition/requirements of the product manufactured
2.16	Characteristics of the product/material
2.17	Effect of inaccurate measuring and testing instruments and equipment.

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:	
• Management • Observational • Interpersonal • Analytical chemistry	• Communication • Analytical Thinking • Computer Proficiency

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	***Assessment requires evidence that the learner:*** 1.1 Trained process members on how to implement quality management system 1.2 Collected and inspected samples and verified their validity 1.3 Verified equipment functionality and recorded according to quality standards 1.4 Adjusted the equipment parameters according to SOP. 1.5 Identified and isolated the non-conformities according to quality standards 1.6 Carried out root cause analysis 1.7 Collected process data to perform process statistical analysis
2. Resource Implications	***The following resources must be provided:*** 2.1 A production line equipment in line with the process. 2.3 Consumables for process, including reagents, chemicals, sample containers and spare parts 2.4 Quality control system and its documentation 2.5 Testing equipment and its accessories 2.6 Process control equipment
3. Methods of Assessment	**Competency may be assessed through:** 3.1 Observation with the use of checklists 3.2 Interviewing to test knowledge 3.3 Written tests 3.4 Portfolio Assessment 3.5 Interview

	3.6 Situation Analysis 3.7 Demonstration and oral questioning
Context of Assessment	Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions
Guidance information for assessment	This unit may be assessed on an integrated basis with others within this occupational sector