Model Curriculum

Lab Technician–Radiographic Testing

SECTOR:	**CAPITAL GOODS**
SUB-SECTOR:	**1. Machine Tools** **2. Dies, Moulds and Press Tools** **3. Plastic Manufacturing Machinery** **4. Textile Manufacturing Machinery** **5. Process Plant Machinery** **6. Electrical and Power Machinery** **7. Light Engineering Goods**
OCCUPATION:	**Quality**
REF ID:	**CSC/Q0603, v1.0**
NSQF LEVEL:	**4**

Skill India
कौशल भारत-कुशल भारत

CGSC
CAPITAL GOODS SKILL COUNCIL

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CAPITAL GOODS SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role / Qualification Pack: '**Lab Technician- Radiographic Testing**' QP No. '**CSC/Q0603 NSQF Level 4**'

Date of Issuance: Nov 24th, 2017
Valid up to : Nov 24th, 2021

**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Capital Goods Skill Council)

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Lab Technician- Radiographic Testing

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Lab Technician- Radiographic Testing", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Lab Technician – Radiographic Testing**		
Qualification Pack Name & Reference ID. ID	CSC/Q0603, v1.0		
Version No.	1.0	**Version Update Date**	24/11/2017
Pre-requisites to Training	Technical Diploma (Mechanical, Chemical, Metallurgy etc.)		
Training Outcomes	**After completing this programme, participants will be able to:** • Perform radiographic testing on metals • Apply basic health and safety practices at the workplace • Work effectively with others		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Lab Technician – Radiographic Testing" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Testing metals using radiography** **Theory Duration** (hh:mm) 30:00 **Practical Duration** (hh:mm) 110:00 **Corresponding NOS Code** CSC/N0603	• Explain the need for radiographic testing • Identify most common metals correctly • Distinguish between DT (Destructive Testing) and NDT (Non-Destructive Testing) • Explain the advantages of NDT • Describe most common NDT methods • Describe the basic principle of radiographic testing • Explain characteristics of X-ray and Gamma ray • Define common terms used in radiographic testing • List radioactive isotopes used in the metal testing • Describe the steps involved in radiographic testing • Analyse the process of image formation • Identify resources and equipment used in the metal testing • Describe the functioning of the each equipment • Interpret regulations and codes of practice to be followed for radiographic testing • Identify the potential hazards associated with radiographic testing • Describe AERB guidelines for industrial radiography • Identify Personal Protective Equipment required for radiographic testing • Describe storage procedure for radioactive sources • Read and establish job requirements from the job specification document accurately • Prepare the work area for the radiographic testing as per the standard operating procedure • Verify that the controlled test zone features are in place • Identify and prepare the test area correctly • Make an entry in the movement register regarding the movement of gamma ray source container • Set up the radiographic testing equipment by considering the critical factors • Prepare the test sample as per the	Training Kit (PowerPoint, Trainer Guide) X-ray tube (Generator) with equipment control, gamma ray source container, photographic type film, Equipment for film development, fixing, washing and drying, Personal Protective Equipment: Safety helmet, safety footwear, respiratory protective equipment, arm and hand protection, eye and face protection, protective clothing and overall, ear protection, safety belt and harness

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		standard procedure • Perform radiographic testing as per the standard procedure • Follow the standard procedure to develop the film to maximise image quality • Perform required documentation as per the company policy • Decide on the further tests by reviewing the results • Seek assistance from the supervisor in case of unresolved problems • Undertake numerical computations • Identify basic, compound and solid shapes • Convey and share technical information • Communicate with people in a respectful manner • Plan, prioritize and sequence work operations as per job requirements • Manage own time for achieving better results • Work in a team in order to achieve better results • Address problems within the control • Identify problems with work planning, procedures, output and behaviour and their implications	
2	**Health and safety** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** CSC/N1335	• Explain the importance of Personal Protective Equipment (PPE) • Identify job site hazards to avoid accidents at the work place • Explain the importance of '5S' at the workplace	Training kit (Trainer guide, PowerPoint) Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes
3	**Fire Safety** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 30:00	• Explain types of fires • Recognise required fire extinguisher based on the type of fire • Identify causes of accidents • Apply PASS method to operate a fire extinguisher • Interpret fire safety signs • Inspect evacuation plan in case of fire • Identify the location of assembly point, fire exit, fire alarm • Follow reporting procedure in case of a fire	Training kit (Trainer guide, PowerPoint) Class A, B, C, D and K fire extinguishers

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code CSC/N1335	• Plan fire safety drills at the workplace	
4	**Emergencies, rescue and first aid procedure** **Theory Duration** (hh:mm) 09:00 **Practical Duration** (hh:mm) 18:00 **Corresponding NOS Code** CSC/N1335	• Follow electrical safety procedures • Use approved method to rescue a person from electrocution • State the importance of first aid • Identify the contents of a first aid kit • Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. • Demonstrate CPR process • Provide first aid for minor injuries • Explain stages of crisis and crisis management	Training kit (Trainer guide, PowerPoint) First aid kit with all contents
5	**Working effectively with others** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 60:00 **Corresponding NOS Code** CSC/N1336	• Explain the importance of team work and team dynamics • State 4Cs of working in a team • Explain types of communication • Apply effective communication technique • Overcome barriers to effective communication • Demonstrate active listening skills • Demonstrate good customer service skills • Explain the importance of ethical behaviour in your day-to-day work • State the importance of discipline in life and apply the same at workplace	Training kit (Trainer guide, PowerPoint)
	Total Duration **Theory Duration** **74:00** **Practical Duration** **226:00**	**Unique Equipment Required:** X-ray tube (Generator) with equipment control, gamma ray source container, photographic type film, Equipment for film development, fixing, washing and drying, Personal Protective Equipment: Safety helmet, safety footwear, respiratory protective equipment, arm and hand protection, eye and face protection, protective clothing and overall, ear protection, safety belt and harness, Class A, B, C, D and K fire extinguishers, First aid kit with all contents	

Grand Total Course Duration: **300 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Capital Goods Skill Council)***

Trainer Prerequisites for Job role: "Lab Technician-Radiographic Testing" mapped to Qualification Pack: "CSC/Q0603 v1.0"

Sr. No.	Area	Details
1	**Description**	Radiographic testing activities on metal products and materials, as per approved procedures.
2	**Personal Attributes**	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness.
3	**Minimum Educational Qualifications**	Diploma /Degree in Mechanical/Chemical/ Metallurgy Engineering
4a	**Domain Certification**	Certified for Job Role: "Lab Technician-Radiographic Testing" mapped to QP: "CSC/Q0603, v1.0". Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted as per respective SSC guidelines is 80%.
5	**Experience**	• 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience

Annexure: Assessment Criteria

Criteria For Assessment Of Trainees

Job Role: Lab Technician-Radiographic Testing

Qualification Pack: CSC/Q0603

Sector Skill Council: Capital Goods Skill Council

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Total Marks: 300	**Compulsory NOS**			**Marks Allocation**	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
CSC/N0603 Perform radiographic testing on metals	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work and ensure process compliance	100	2	0	2
	PC2.adhere to procedures or systems in place for risk assessment, occupational standards, personal protective equipment (PPE) and other relevant occupational safety regulations		4	1	3
	PC3.work following laid down procedures and instructions		3	1	2
	PC4.evacuate the non-radiographic personnel from the area before starting the work		2	0	2
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition and are kept at secured location		2	0	2
	PC6.ensure that all measuring equipment are within calibration date and are approved for usage		2	0	2

	PC7.ensure work area is clean and safe from hazards before and after the job is completed		2	0	2
	PC8.obtain job specification from a valid and approved source		2	0	2
	PC9.read and establish job requirements from the job specification document accurately		2	0	2
	PC10.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		3	1	2
	PC11.prepare the work area for the testing operations as per procedure		3	1	2
	PC12.obtain correct work-pieces/raw materials to be tested		2	0	2
	PC13.identify the products and materials to be tested as per job specifications accurately		3	1	2
	PC14.ensure that all features of the Controlled Test Zone are in place and are operating correctly (such as barriers, lights, signs, radiation, survey meters)		3	1	2
	PC15.ensure that the product test areas are correctly prepared and identified		2	0	2
	PC16.check that all equipment and consumables are as specified and fit for purpose		3	1	2
	PC17.ensure that gamma ray source containers are removed from the approved store and recording done in the Source Movement Register		2	0	2
	PC18.set up the radiographic testing equipment to provide all of the following factors		4	2	2
	PC19.check conditions required for tests to be undertaken		3	1	2
	PC20.power up equipment as per the testing methods to be undertaken		2	0	2
	PC21.prepare the test samples in accordance with the procedures and check their integrity		4	2	2
	PC22.follow the appropriate procedures for use of tools and equipment to carry out the required tests		4	1	3
	PC23.follow the defined radiographic testing procedures, and apply safe working practices and procedures at all times		6	2	4
	PC24.carry out the required tests in accordance with the procedures and confirm the safe containment of the radiation source in the equipment		6	2	4
	PC25.ensure radiographic tests are carried out in accordance with relevant standards, codes, specifications and OH&S requirements		3	1	2
	PC26.process films to maximize quality of image		2	0	2

	PC27.record the results of the tests undertaken in the appropriate format		2	0	2
	PC28.methods used to communicate to required information about the test results in accordance with departmental and organisational procedures		3	1	2
	PC29.complete documentation post completion of work, as per procedure		3	1	2
	PC30.secure tools and equipment in a safe condition on completion of the testingactivities		3	1	2
	PC31.close down the equipment to a safe condition		2	0	2
	PC32.return gamma radiation source containers to the approved store		3	1	2
	PC33.remove warning notices and barriers, and reinstating the work area		2	0	2
	PC34.review the results and carry out further tests if necessary		2	0	2
	PC35.refer unresolved job related problems to appropriate personnel for support		2	0	2
	PC36.monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem		2	0	2
		Total	**100**	**22**	**78**
CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	4	1	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3
	PC12.identify common hazard signs displayed in various areas		3	1	2

	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3
	PC14.use the various appropriate fire extinguishers on different types of fires correctly		3	1	2
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2
	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		3	1	2
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC23.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC24.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC25.participate in emergency procedures		4	1	3
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		4	2	2
		Total	**100**	**36**	**64**
CSC/N1336 Work effectively with others	PC1.receive information accurately and instructions from the supervisor and fellow workers, getting clarification where required	100	10	3	7
	PC2.pass information accurately to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in		10	3	7

	carrying out tasks				
	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
		Total	**100**	**30**	**70**