



# Model Curriculum

**QP Name: Wafer Test & Sort Engineer**

**QP Code: ELE/Q0122**

**QP Version: 2.0**

**NSQF Level: 5**

**Model Curriculum Version: 2.0**

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House, Okhla Industrial Area - Phase 3, New Delhi – 110020

# Table of Contents

Training Parameters .....	3
Program Overview.....	4
Training Outcomes .....	4
Compulsory Modules .....	4
Module 1: Introduction .....	6
Module 2: Wafer Inspection.....	7
Module 3: Test & Sort .....	8
Module 4: Prober Handling .....	9
Module 5: Machine Buy OFF/Tools & Consumables Qualifications.....	10
Module 6: Health & Safety Practice .....	11
Module 7: Employability Skills (60 Hours) .....	12
Module 8: On-the-job Training .....	13
Annexure .....	14
Trainer Requirements.....	14
Assessor Requirements .....	15
Assessment Strategy .....	16
References.....	18
Glossary .....	18
Acronyms and Abbreviations.....	19

## Training Parameters

<b>Sector</b>	Electronics
<b>Sub-Sector</b>	Semiconductor & Components
<b>Occupation</b>	Production-S&C
<b>Country</b>	India
<b>NSQF Level</b>	5
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7223.2800
<b>Minimum Educational Qualification and Experience</b>	Diploma (After 10 (Electronics/Mechanical)) with 1 Year of Relevant Experience OR 12th grade pass with 1 year NTC/ NAC with 1 Year of Relevant Experience OR 12th grade Pass with 2 Years of Relevant Experience OR Previous relevant Qualification of NSQF Level (4) with 3 Years of Relevant Experience OR 10th grade pass with 4 Years of Relevant Experience
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	31.03.2022
<b>Next Review Date</b>	31.03.2025
<b>NSQC Approval Date</b>	31.03.2022
<b>QP Version</b>	2.0
<b>Model Curriculum Creation Date</b>	31.03.2022
<b>Model Curriculum Valid Up to Date</b>	31.03.2025
<b>Model Curriculum Version</b>	2.0
<b>Maximum Duration of the Course</b>	780 Hours

## Program Overview

This section summarizes the end objectives of the program along with its duration.

### Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills:

- Describe the process of Semiconductor Manufacturing, Assembly, Testing & Packaging evaluating customer requirements and computer issues.
- Demonstrate the evaluation process of customer requirements and semiconductors processing.
- Demonstrate the uses of all standards related to Wafer Test & Sort Engineer
- Demonstrate the process of Implementation of all Prober Handling and Processes
- Demonstrate various practices to be followed to maintain health and safety at work.

### Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>	<b>21:00</b>	<b>39:00</b>	<b>00:00</b>	<b>00:00</b>	<b>60:00</b>
Module 1: Introduction of Wafer Test & Sort	21:00	39:00	00:00	00:00	60:00
<b>ELE/N0152 Wafer Inspection</b>	<b>30:00</b>	<b>60:00</b>	<b>30:00</b>	<b>00:00</b>	<b>120:00</b>
Module 2: Wafer Inspection	30:00	60:00	30:00	00:00	120:00
<b>ELE/N0153 Test &amp; Sort</b>	<b>30:00</b>	<b>60:00</b>	<b>60:00</b>	<b>00:00</b>	<b>150:00</b>
Module 3: Test & Sort	30:00	60:00	60:00	00:00	150:00
<b>ELE/N0154 Prober Handling</b>	<b>60:00</b>	<b>60:00</b>	<b>60:00</b>	<b>00:00</b>	<b>180:00</b>
Module 4: Prober Handling	60:00	60:00	60:00	00:00	180:00
<b>ELE/N0155 Machine Buy Off/Tools &amp; Consumable Qualifications</b>	<b>60:00</b>	<b>60:00</b>	<b>60:00</b>	<b>00:00</b>	<b>180:00</b>

Module 5: Machine Buy Off/Tools & Consumable Qualifications	60:00	60:00	60:00	00:00	180:00
<b>ELE/N1002 Apply Health and Safety Practices at Workplace</b>	<b>15:00</b>	<b>15:00</b>	<b>00:00</b>	<b>00:00</b>	<b>30:00</b>
Module 6: Apply health and Safety Practices at Workplace	15:00	15:00	00:00	00:00	30:00
<b>DGT/VSQ/N0102- Employability Skills (60 Hours)</b>	<b>24:00</b>	<b>36:00</b>	<b>00:00</b>	<b>00:00</b>	<b>60:00</b>
Module 7: Employability Skills (60 Hours)	24:00	36:00	00:00	00:00	60:00
<b>Total Duration</b>	<b>240:00</b>	<b>330:00</b>	<b>210:00</b>	<b>00:00</b>	<b>780:00</b>

# Module Details

## Module 1: Introduction

### Bridge Module

#### Terminal Outcomes:

- State the role and responsibilities of a Wafer Test and Sort Engineer

Duration: 21:00	Duration: 39:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Describe the size and scope of the electronics industry and its sub-sectors</li> <li>• Discuss the role and responsibilities of a Wafer Test &amp; Sort Engineer</li> <li>• Describe various employment opportunities for Wafer Test &amp; Sort Engineer</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of the Wafer Test &amp; Sort processes</li> <li>• Knowledge of the faults and troubleshooting in the Wafer Test &amp; Sort processes</li> <li>• Understanding of the other processes and mechanism involved with the Wafer Test &amp; Sort system</li> </ul>
<b>Classroom Aids</b>	
Training Kit - Trainer guide, Presentations, Whiteboard, Marker, projector, laptop	
<b>Tools, Equipment and Other Requirements</b>	
Wafer Inspection Tools	

## Module 2: Wafer Inspection

### Mapped to ELE/N0152

#### Terminal Outcomes:

- State the role and responsibilities of a Wafer Inspector

<b>Duration: 30:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Inspect Wafer physically to find out any defects</li> <li>• Make mapping of each wafer based on defects</li> <li>• Expert in finding out micro level defects</li> <li>• Document Wafer Map &amp; Pass to Next Process</li> <li>• Yield Tracking Using SPC or Statistical System</li> </ul>	<ul style="list-style-type: none"> <li>• Generate Wafer Defect Map</li> <li>• Set Up process Tolerances</li> <li>• Prepare quality flow and procedures for New and existing processes</li> <li>• Yield Tracking Using SPC or Statistical System</li> </ul>
<b>Classroom Aids</b>	
Training Kit - Trainer guide, Presentations, Whiteboard, Marker, projector, laptop	
<b>Tools, Equipment and Other Requirements</b>	
Wafer Inspection Tools	

## Module 3: Test & Sort

### Mapped to ELE/N0153

#### Terminal Outcomes:

- Describe the process of standard implementations for Testing & Sorting's of Wafer's
- Demonstrate the process of verification all Parameters

<b>Duration: 30:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Understand the memory Structure</li> <li>• Knowledge of doing some manual testing</li> <li>• Trace Back the failures and link them to processes</li> <li>• Create wafer mapping Good Versus Bad</li> <li>• Debugging the customer return failures</li> <li>• Trace Back the failures and link them to processes</li> </ul>	<ul style="list-style-type: none"> <li>• Mold Compound curing oven setup parameters should be included</li> <li>• Understanding of electrical failure analysis tools</li> <li>• Train Operators on SOP Flow</li> <li>• Knowledge of doing some manual testing</li> </ul>
<b>Classroom Aids</b>	
Training kit (Trainer guide, Presentations). Whiteboard, Marker, projector, laptop	
<b>Tools, Equipment and Other Requirements</b>	
Test and Sort Equipment's and Procedure's	



## Module 4: Prober Handling

### Mapped to ELE/N0154

- Describe the process of Prober Handling.
- Demonstrate the process of Prober Handling
- Demonstrate the process of cost and Productivity Improvement

Duration: 60:00	Duration: 60:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Prober Selection</li> <li>• Prober Setup</li> <li>• Prober test sockets/Pin Selection</li> <li>• Prober check Table Temperature</li> <li>• Collect the testing data</li> <li>• Wafer loading and unloading</li> </ul>	<ul style="list-style-type: none"> <li>• Generate diagrams of Each Test</li> <li>• Analysis of Spec. data and Diagram</li> <li>• feed test pad locations to System.</li> <li>• Integration of Test and Prober</li> <li>• Give Test commands prober</li> </ul>
Classroom Aids	
Training kit (Trainer guide, Presentations). Whiteboard, Marker, projector, laptop	
Tools, Equipment and Other Requirements	
Probers Handling and Process	

## Module 5: Machine Buy Off/Tools & Consumables Qualifications

### Mapped to ELE/N0155

#### Terminal Outcomes:

- Knowledge about all tools and equipment's useful Which are required for The Wafer Test and Sorting's
- Knowledge about all tools and equipment's useful for Wafer Testing and to implement Quality Standards

<b>Duration: 60:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• MSL related to tool Operation and process set up</li> <li>• HAST (BHAST/UHAST) related to tool Operation and process set up</li> <li>• TCT related to tool Operation and process set up</li> <li>• STHT related to tool Operation and process set up</li> <li>• HALT related to tool Operation and process set up</li> <li>• Thermal Shock related to tool Operation and process set up</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the generation of PCN</li> <li>• Process of preparation of Solid Reports</li> </ul> <p>Description on All equipment consumables specifications, dimensions and other parameters should be clearly defined by process and equipment engineer</p>
<b>Classroom Aids</b>	
Training kit (Trainer guide, Presentations)	
<b>Tools, Equipment and Other Requirements</b>	
Equipment's related to Wafer Test and Sort	

## Module 6: Apply work and health safety practices

### Mapped to ELE/N1002

#### Terminal Outcomes:

- Apply health and safety practices at the workplace.

<b>Duration: 15:00</b>	<b>Duration: 15:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss job-site hazards, risks and accidents.</li> <li>• Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials.</li> <li>• Elaborate the electronic waste disposal procedures.</li> <li>• Describe the process of disposal of hazardous waste</li> <li>• List the name and location of concerned people, documents and equipment for maintaining health and safety in the workplace.</li> <li>• Describe how to interpret warning signs while accessing sensitive work areas.</li> <li>• Explain the importance of good housekeeping.</li> <li>• Describe the importance of maintaining appropriate postures while lifting heavy objects.</li> <li>• List the types of fire and fire extinguishers.</li> <li>• Explain the importance of efficient utilisation of water, electricity and other resources.</li> <li>• List the common sources of pollution and ways to minimize it.</li> <li>• Describe the concept of waste management and methods of disposing hazardous waste.</li> <li>• Explain various warning and safety signs.</li> <li>• Describe different ways of preventing accidents at the workplace.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the use of protective equipment suitable as per tasks and work conditions.</li> <li>• Report any abnormal situation/behaviour of any equipment/system to the relevant authorities.</li> <li>• Administer first aid in case of a minor accident.</li> <li>• Demonstrate the steps to free a person from electrocution safely.</li> <li>• Administer Cardiopulmonary Resuscitation (CPR).</li> <li>• Demonstrate the application of defined emergency procedures such as raising alarm, safe/efficient, evacuation, moving injured people, etc.</li> <li>• Prepare a sample incident report.</li> <li>• Use a fire extinguisher in case of a fire incident.</li> <li>• Demonstrate the correct method of lifting and handling heavy objects.</li> </ul>
<b>Classroom Aids</b>	
Training kit (Trainer guide, Presentations)	
<b>Tools, Equipment and Other Requirements</b>	
Personal Protection Equipment: safety glasses, head protection, rubber gloves, safety footwear, warning signs and tapes, fire extinguisher, first aid kit, fire extinguishers and warning signs.	

## Module 8: On-the-Job Training

### Mapped to Wafer Test and Sort Engineer

<b>Mandatory Duration: 210:00</b>	<b>Recommended Duration: 00:00</b>
<b>Location: On Site</b>	
<p><b>Terminal Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Explain the functions of a Wafer Test and Sort's in Semiconductors.</li> <li>2. List the preliminary tasks involved in the repair and maintenance of a Tools and Equipment's</li> <li>3. Demonstrate how to perform preliminary checks on a computer and its peripherals.</li> <li>4. Perform steps to inspect the computer and its peripherals to identify defective modules/ components.</li> <li>5. Perform repair and maintenance activities as per the Service Level Agreement (SLA).</li> <li>6. Perform steps to test the functioning of Wafer Test &amp; Sort after repair.</li> <li>7. Communicate product and service-related information to the customer.</li> <li>8. Employ appropriate practices to interact and coordinate with supervisor and colleagues.</li> <li>9. Perform assigned work within the turnaround time and as per the defined quality standards.</li> <li>10. Demonstrate how to maintain a healthy, safe and secure working environment.</li> </ol>	

# Annexure

## Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma/ Degree/ ITI/ Certified in relevant CITS Trade	(Electrical/Electronics/ Mechanical)	2	Assembly & Packaging	1	Electronics	

Trainer Certification	
Domain Certification	Platform Certification
“Wafer Test and Sort Engineer, ELE/Q0122, version 2.0”. Minimum accepted score is 80%.	Recommended that the Trainer is certified for the <b>Wafer Test and Sort Engineer</b> “Trainer (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2601, V2.0”, with minimum score of 80%

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma/ Degree/ ITI/ Certified in relevant CITS Trade	(Electrical/Electronics/ Mechanical)	3	Assembly & Packaging	1	Electronics	

Assessor Certification	
Domain Certification	Platform Certification
“Wafer Test and Sort Engineer, ELE/Q0122, version 2.0”. Minimum accepted score is 80%.	Recommended that the Assessor is certified for the <b>Wafer Test and Sort Engineer</b> “Assessor (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2701, V2.0”, with minimum score of 80%

## Assessment Strategy

### 1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC
- The assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process & records

### 2. Testing Environment

To ensure a conducive environment for conducting a test, the trainer will:

- Confirm that the centre is available at the same address as mentioned on SDMS or SIP
- Check the duration of the training.
- Check the Assessment Start and End time to be 10 a.m. and 5 p.m. respectively
- Ensure there are 2 Assessors if the batch size is more than 30.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

### 3. Assessment Quality Assurance levels / Framework:

- Question papers created by the Subject Matter Experts (SME)
- Question papers created by the SME verified by the other subject Matter Experts
- Questions are mapped with NOS and PC
- Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
- The assessor must be ToA certified and the trainer must be ToT Certified
- The assessment agency must follow the assessment guidelines to conduct the assessment

### 4. Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location
- Centre photographs with signboards and scheme-specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

### 5. Method of verification or validation:

To verify the details submitted by the training centre, the assessor will undertake:

- A surprise visit to the assessment location
- A random audit of the batch
- A random audit of any candidate

### 6. Method for assessment documentation, archiving, and access

To protect the assessment papers and information, the assessor will ensure:

- Hard copies of the documents are stored

- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored on the Hard drive



# References

## Glossary

Term	Description
<b>Declarative knowledge</b>	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
<b>Key Learning</b>	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of the training.</b>
<b>Terminal Outcome</b>	Terminal outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of a module.</b> A set of terminal outcomes help to achieve the training outcome.

## Acronyms and Abbreviations

Term	Description
DC	Direct Current
ISO	International Organization for Standardization
NCO	National Occupational Standards
NOS	National Skills Qualification Committee
NSQF	National Skills Qualification Framework
OJT	On-the-Job Training
OMR	Optical Mark Recognition
PC	Performance Criteria
PwD	Persons with Disabilities
QP	Qualification Pack
SDMS	Skill Development & Management System
SIP	Skill India Portal
SME	Small and Medium Enterprises
SOP	Standard Operating Procedure
SSC	Sector Skill Council
TC	Trainer Certificate
ToA	Training of Assessors
ToT	Training of Trainers
TP	Training Provider