

## Qualification Pack



# Wafer Back Grinding Engineer

QP Code: ELE/Q0125

Version: 1.0

NSQF Level: 5

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House Okhla Industrial Area-Phase 3  
New Delhi- 110020 || email:ceo@essc-india.org



## Qualification Pack

### Contents

|   |    |
|---|----|
| ELE/Q0125: Wafer Back Grinding Engineer .....                       | 3  |
| <i>Brief Job Description</i> .....                                  | 3  |
| Applicable National Occupational Standards (NOS) .....              | 3  |
| <i>Compulsory NOS</i> .....   | 3  |
| <i>Qualification Pack (QP) Parameters</i> .....                     | 3  |
| ELE/N0132: Program Readiness .....                                  | 5  |
| ELE/N0137: Cost & Productivity Improvement .....                    | 12 |
| ELE/N0138: Back Grinding Design & Verification .....                | 18 |
| ELE/N0139: Supply Chain of Machine and Tools .....                  | 23 |
| ELE/N9905: Work effectively at the workplace .....                  | 30 |
| ELE/N1002: Apply health and safety practices at the workplace ..... | 38 |
| Assessment Guidelines and Weightage .....                           | 45 |
| <i>Assessment Guidelines</i> .....                                  | 45 |
| <i>Assessment Weightage</i> .....                                   | 46 |
| Acronyms .....  | 47 |
| Glossary .....  | 48 |

## Qualification Pack

### ELE/Q0125: Wafer Back Grinding Engineer

#### Brief Job Description

Wafer Grinding - Process Engineer works on Wafer Grinding Process & responsible for preparing recipe (Process Parameters), Data Analysis, Yield Maintenance & Improvements, Productivity Improvements etc all. He need to know complete process of Wafer Grinding during IC Packaging to handle process. Create process for new products

#### Personal Attributes

The individual must have an aptitude for details along with analytical and problem-solving skills. The person should be able to work in co-ordination with others. The individual should be able to communicate appropriately, both verbally and in writing.

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [ELE/N0132: Program Readiness](#)
2. [ELE/N0137: Cost & Productivity Improvement](#)
3. [ELE/N0138: Back Grinding Design & Verification](#)
4. [ELE/N0139: Supply Chain of Machine and Tools](#)
5. [ELE/N9905: Work effectively at the workplace](#)
6. [ELE/N1002: Apply health and safety practices at the workplace](#)

#### Qualification Pack (QP) 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>Credits</b>    | NA                         |

## Qualification Pack

|   |  |
|---|--|
| <b>Aligned to NCO/ISCO/ISIC Code</b>                      | NCO-2015/NIL   |
| <b>Minimum Educational Qualification &amp; Experience</b> | Diploma (after 10th (Electrical or Electronics Engineering) with 3 Years of Relevant experience<br>OR Diploma after 12th (Electrical or Electronics Engineering) with 1 Years of Relevant experience)<br>OR<br>B.E./B.Tech (Degree in Electrical or Electronics Engineering)<br>OR<br>Certificate-NSQF (Level-4 in semiconductor domain) with 2 Years of experience relevant |
| <b>Minimum Level of Education for Training in School</b>  | Not Applicable   |
| <b>Pre-Requisite License or Training</b>                  | NA   |
| <b>Minimum Job Entry Age</b>                              | 20 Years   |
| <b>Last Reviewed On</b>                                   | 31/03/2022   |
| <b>Next Review Date</b>                                   | 31/07/2025   |
| <b>NSQC Approval Date</b>                                 | 31/03/2022   |
| <b>Version</b>  | 1.0  |
| <b>Reference code on NQR</b>                              | 2022/EHW/ESSC/05633  |
| <b>NQR Version</b>  | 1.0  |

## Qualification Pack

### ELE/N0132: Program Readiness

#### Description

Wafer Grinding - Process Engineer works on Wafer Grinding Process & responsible for preparing recipe (Process Parameters), Data Analysis, Yield Maintenance & Improvements, Productivity Improvements etc all. He need to know complete process of Wafer Grinding during IC Packaging to handle process. Create process for new products

#### Scope

The scope covers the following :

- Define Process
- Verify Process Parameters
- Prepare SOP & Support Design
- Manage Daily Activity

#### Elements and Performance Criteria

##### *Define Process*

To be competent, the user/individual on the job must be able to:

- PC1.** identify the wafer Structure
- PC2.** specify the Die Dimensions, Wafer Scrub Line's width, Internal Material Structure and thickness & Wafer Thickness
- PC3.** define Grinding Wheel types & size etc
- PC4.** set up all process parameters such as speed, Grinding Thickness, height, fiducial marks, orientation, vacuum level, Water Flow etc
- PC5.** specify & set to run dummy samples
- PC6.** set up all measurement instructions and see if all dimensions are within spec. or not
- PC7.** Highlight if any special requirement is needed
- PC8.** perform the measurement and see if all dimensions are within spec. or not
- PC9.** prepare to repeat until meeting the criteria if not meeting the spec criteria
- PC10.** prepare input major parameters into Standard Operating Procedure (SOP)
- PC11.** prepare full SOP and release to production
- PC12.** perform special requirements is needed

##### *Verify Process Parameters*

To be competent, the user/individual on the job must be able to:

- PC13.** identify the product parameters are done like mentioned below for the wafer verification of process
- PC14.** prepare a copy of the old recipe to perform a similar program
- PC15.** identify to make changes as per product specification requirement
- PC16.** perform to run dummy measurements, Calculate Process Capability (CPK), Process Performance (PPK), and other quality parameters

## Qualification Pack

- PC17.** check the program need to save if all ok
- PC18.** perform to run real wafer
- PC19.** verify the real wafer using various quality and reliability checks
- PC20.** prepare for mass production, if all QCs are passed

### *Prepare SOP & Support Design*

To be competent, the user/individual on the job must be able to:

- PC21.** use Automatic Computer-Aided Design (AUTO-CAD) as per organisation standards
- PC22.** prepare Process flow with clear specifications like Temp., Speed, Water Flow, Vacuum, Grinding Direction, Roughness, Grinding Material Type etc
- PC23.** prepare SOP in such a way so that it is more understandable to operators with pictures, visuals, data Charts etc.
- PC24.** identify training needs of operators on SOP flow
- PC25.** prepare traveling card with the defined process or program name/ code

### *Manage Daily Activity*

To be competent, the user/individual on the job must be able to:

- PC26.** prepare traveling cards released to production are ok
- PC27.** perform regular inspection of programs
- PC28.** perform regular inspection of data such as yield, failure, etc
- PC29.** prepare for any emergency situation
- PC30.** prepare daily activity plan

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** how to identify the die dimensions and back grinding processes
- KU2.** the importance of analyzing the die attach film/material properties and thickness requirements
- KU3.** how to evaluate the curing and attaching conditions of die-attach film/material
- KU4.** how to recognize the structure of stacking (die thickness and substrate thickness with die attach film/material thickness)
- KU5.** how to specify the bonding force, pick & place location, curing parameters inside the oven, etc
- KU6.** the procedure of setting up all process parameters, such as bonding force, placements, attaching speed, adhesive thickness, wafer and substrate location moving speed, etc.
- KU7.** how to set to run dummy samples
- KU8.** the importance of taking measurements to ensure all dimensions are within specification
- KU9.** the importance of repeating the criteria until the specified criteria are met
- KU10.** how to turn major input parameters into Standard Operating Procedure (SOP)
- KU11.** the importance of preparing full SOP and releasing it to production, and considering the special requirements, if required
- KU12.** the importance of identifying the parameters for the new product verification process

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- KU13.** how to prepare a copy of the old recipe to perform a similar program
- KU14.** the importance of identifying and making changes as per the product specification requirements
- KU15.** how to run dummy measurements, Calculate Process Capability (CPK), Process Performance (PPK), and other quality parameters
- KU16.** the importance and process of verifying the real product using various quality and reliability checks
- KU17.** the importance of preparing for mass production after all QCs are passed
- KU18.** how to use Automatic Computer-Aided Design (AUTO-CAD) software
- KU19.** the procedure of preparing process flow with clear specifications, such as temperature, speed, water flow, vacuumed, etc.
- KU20.** the importance of preparing the SOP with pictures, visuals, data charts to ensure it is more understandable to operators
- KU21.** the importance of identifying the training needs of operators on SOP flow
- KU22.** the process of preparing the travelling card with the defined process or program name/ code
- KU23.** the importance of ensuring the quality of all the travelling cards released to production
- KU24.** the importance of performing regular inspection of programs
- KU25.** the importance of performing regular inspection of data, such as yield, failure, etc
- KU26.** the importance of preparing for emergencies

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/ accidents

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <i>Define Process</i>  | <b>22</b>    | <b>26</b>       | -             | <b>4</b>   |
| <b>PC1.</b> identify the wafer Structure   | 2            | 3               | -             | 1          |
| <b>PC2.</b> specify the Die Dimensions, Wafer Scrub Line's width, Internal Material Structure and thickness & Wafer Thickness                  | 2            | 3               | -             | 1          |
| <b>PC3.</b> define Grinding Wheel types & size etc   | 2            | 2               | -             | 1          |
| <b>PC4.</b> set up all process parameters such as speed, Grinding Thickness, height, fiducial marks, orientation, vacuum level, Water Flow etc | 2            | 2               | -             | 1          |
| <b>PC5.</b> specify & set to run dummy samples   | 2            | 2               | -             | -          |
| <b>PC6.</b> set up all measurement instructions and see if all dimensions are within spec. or not  | 2            | 2               | -             | -          |
| <b>PC7.</b> Highlight if any special requirement is needed   | 2            | 2               | -             | -          |
| <b>PC8.</b> perform the measurement and see if all dimensions are within spec. or not  | 2            | 2               | -             | -          |
| <b>PC9.</b> prepare to repeat until meeting the criteria if not meeting the spec criteria  | 2            | 2               | -             | -          |
| <b>PC10.</b> prepare input major parameters into Standard Operating Procedure (SOP)  | 2            | 2               | -             | -          |
| <b>PC11.</b> prepare full SOP and release to production  | 1            | 2               | -             | -          |
| <b>PC12.</b> perform special requirements is needed  | 1            | 2               | -             | -          |
| <i>Verify Process Parameters</i>   | <b>8</b>     | <b>12</b>       | -             | <b>2</b>   |
| <b>PC13.</b> identify the product parameters are done like mentioned below for the wafer verification of process                               | 1            | 2               | -             | 1          |
| <b>PC14.</b> prepare a copy of the old recipe to perform a similar program   | 1            | 2               | -             | 1          |
| <b>PC15.</b> identify to make changes as per product specification requirement   | 1            | 2               | -             | -          |



### Qualification Pack

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <b>PC16.</b> perform to run dummy measurements, Calculate Process Capability (CPK), Process Performance (PPK), and other quality parameters                  | 1            | 2               | -             | -          |
| <b>PC17.</b> check the program need to save if all ok  | 1            | 1               | -             | -          |
| <b>PC18.</b> perform to run real wafer   | 1            | 1               | -             | -          |
| <b>PC19.</b> verify the real wafer using various quality and reliability checks  | 1            | 1               | -             | -          |
| <b>PC20.</b> prepare for mass production, if all QCs are passed  | 1            | 1               | -             | -          |
| <i>Prepare SOP &amp; Support Design</i>  | <b>5</b>     | <b>6</b>        | -             | <b>2</b>   |
| <b>PC21.</b> use Automatic Computer-Aided Design (AUTO-CAD) as per organisation standards  | 1            | 1               | -             | 1          |
| <b>PC22.</b> prepare Process flow with clear specifications like Temp., Speed, Water Flow, Vacuum, Grinding Direction, Roughness, Grinding Material Type etc | 1            | 1               | -             | 1          |
| <b>PC23.</b> prepare SOP in such a way so that it is more understandable to operators with pictures, visuals, data Charts etc.                               | 1            | 1               | -             | -          |
| <b>PC24.</b> identify training needs of operators on SOP flow  | 1            | 1               | -             | -          |
| <b>PC25.</b> prepare traveling card with the defined process or program name/ code   | 1            | 2               | -             | -          |
| <i>Manage Daily Activity</i>   | <b>5</b>     | <b>6</b>        | -             | <b>2</b>   |
| <b>PC26.</b> prepare traveling cards released to production are ok   | 1            | 1               | -             | 1          |
| <b>PC27.</b> perform regular inspection of programs  | 1            | 2               | -             | 1          |
| <b>PC28.</b> perform regular inspection of data such as yield, failure, etc  | 1            | 1               | -             | -          |
| <b>PC29.</b> prepare for any emergency situation   | 1            | 1               | -             | -          |
| <b>PC30.</b> prepare daily activity plan   | 1            | 1               | -             | -          |



## Qualification Pack

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|----------------------------------|--------------|-----------------|---------------|------------|
| NOS Total                        | 40           | 50              | -             | 10         |

## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |                            |
|----------------------------|----------------------------|
| <b>NOS Code</b>            | ELE/N0132                  |
| <b>NOS Name</b>            | Program Readiness          |
| <b>Sector</b>              | Electronics                |
| <b>Sub-Sector</b>          | Semiconductor & Components |
| <b>Occupation</b>          | Production-S&C             |
| <b>NSQF Level</b>          | 5                          |
| <b>Credits</b>             | TBD                        |
| <b>Version</b>             | 1.0                        |
| <b>Last Reviewed Date</b>  | 31/03/2022                 |
| <b>Next Review Date</b>    | 31/07/2025                 |
| <b>NSQC Clearance Date</b> | 31/03/2022                 |

## Qualification Pack

### ELE/N0137: Cost & Productivity Improvement

#### Description

The OS unit is about manage product quality, cost and improvement of productivity.

#### Scope

The scope covers the following :

- Wafer and Die Quality
- Yield Tracking
- Yield, Cost, and Productivity Improvement

#### Elements and Performance Criteria

##### *Wafer and Die Quality*

To be competent, the user/individual on the job must be able to:

- PC1.** define all wafer Dimension tolerance, wafer edge Chipping Size, wafer thickness & roughness, Keep out zone area, wafer warpage etc
- PC2.** define sample size for each lot to measure all dimensions
- PC3.** list down measurement technique in SOP for Operators
- PC4.** after Collecting Data, Do statistic's analysis if it is within specification release the lot to next step
- PC5.** define all consumables pack specifications clearly
- PC6.** inspect regularly for each consumable
- PC7.** any failure at Wafer Grinding should be passed through failure analysis
- PC8.** check the root cause of each failure
- PC9.** define short term and long-term actions or failures to reduce the failure rate
- PC10.** prepare an 8D report

##### *Yield Tracking*

To be competent, the user/individual on the job must be able to:

- PC11.** prepare yield data collection for each product
- PC12.** analyse the yield
- PC13.** analysis data using statistical methods
- PC14.** prepare ppt and present to management on WW bases
- PC15.** prepare necessary steps if the yield is lower than the target
- PC16.** record all failures along with actions to avoid future failure

##### *Yield, Cost, and Productivity Improvement*

To be competent, the user/individual on the job must be able to:

- PC17.** prepare strategies for further improvements
- PC18.** perform research and development (R&D) to improvements
- PC19.** identify broad material knowledge to reduce cost

## Qualification Pack

- PC20.** perform the working principle of machines to improve UPH
- PC21.** prepare the design of experiments (DOE) expertise
- PC22.** knowledge of running statistical tools such as (Joint Manpower Program) JMP
- PC23.** perform regular interaction with the customer, supplier, and internal teams
- PC24.** knowledge of Auto CAD generated designs

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance of defining all die dimensions, stacking combination, and wire bonding parameters
- KU2.** how to define sample size for each lot to measure all dimensions
- KU3.** the importance of preparing the measurement techniques in the SOP for operators
- KU4.** the importance of analyzing the collected data and performing statistical analysis to determine if it is within the specification before releasing the lot to the next step
- KU5.** how to identify the consumables pack specifications
- KU6.** the importance of regularly inspecting for each consumable
- KU7.** how to identify any failure at die attach
- KU8.** the importance of ensuring wire bond passes through failure analysis
- KU9.** the importance of checking the root cause of each failure
- KU10.** the importance of defining the short term and long-term actions or failures to reduce the failure rate
- KU11.** how to prepare an 8D report
- KU12.** the importance of preparing the yield data collection for each product
- KU13.** how to analyze the yield
- KU14.** the importance of analyzing data using statistical methods
- KU15.** the importance of recording all failures along with actions to avoid future failure
- KU16.** the importance of performing Research and Development (R&D) and preparing strategies for further improvements
- KU17.** the working principle of machines to improve UPH
- KU18.** how to develop the design of experiments (DOE) expertise
- KU19.** the process of running statistical tools, such as the Joint Manpower Program (JMP)
- KU20.** the importance of regularly interacting with customers, suppliers, and internal teams
- KU21.** the process generating designs using Auto-CAD

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write work-related notes and maintain relevant records
- GS2.** read the relevant literature to get the latest updates about the field of work



## Qualification Pack

- GS3.** listen attentively to understand the information/ instructions being shared by the speaker
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** evaluate all possible solutions to a problem to select the best one
- GS7.** co-ordinate with the co-workers to achieve work objectives
- GS8.** identify possible disruptions to work and take appropriate preventive measures
- GS9.** take quick decisions to deal with workplace emergencies/ accidents

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <i>Wafer and Die Quality</i>   | <b>18</b>    | <b>20</b>       | -             | <b>6</b>   |
| <b>PC1.</b> define all wafer Dimension tolerance, wafer edge Chipping Size, wafer thickness & roughness, Keep out zone area, wafer warpage etc | 2            | 2               | -             | 1          |
| <b>PC2.</b> define sample size for each lot to measure all dimensions  | 2            | 2               | -             | 1          |
| <b>PC3.</b> list down measurement technique in SOP for Operators   | 2            | 2               | -             | 1          |
| <b>PC4.</b> after Collecting Data, Do statistic's analysis if it is within specification release the lot to next step                          | 2            | 2               | -             | 1          |
| <b>PC5.</b> define all consumables pack specifications clearly   | 2            | 2               | -             | 1          |
| <b>PC6.</b> inspect regularly for each consumable  | 2            | 2               | -             | 1          |
| <b>PC7.</b> any failure at Wafer Grinding should be passed through failure analysis  | 2            | 2               | -             | -          |
| <b>PC8.</b> check the root cause of each failure   | 2            | 2               | -             | -          |
| <b>PC9.</b> define short term and long-term actions or failures to reduce the failure rate   | 1            | 2               | -             | -          |
| <b>PC10.</b> prepare an 8D report  | 1            | 2               | -             | -          |
| <i>Yield Tracking</i>  | <b>8</b>     | <b>12</b>       | -             | <b>2</b>   |
| <b>PC11.</b> prepare yield data collection for each product  | 2            | 2               | -             | 1          |
| <b>PC12.</b> analyse the yield   | 2            | 2               | -             | 1          |
| <b>PC13.</b> analysis data using statistical methods   | 1            | 2               | -             | -          |
| <b>PC14.</b> prepare ppt and present to management on WW bases   | 1            | 2               | -             | -          |
| <b>PC15.</b> prepare necessary steps if the yield is lower than the target   | 1            | 2               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <b>PC16.</b> record all failures along with actions to avoid future failure              | 1            | 2               | -             | -          |
| <i>Yield, Cost, and Productivity Improvement</i>   | <b>14</b>    | <b>18</b>       | -             | <b>2</b>   |
| <b>PC17.</b> prepare strategies for further improvements                                 | 2            | 3               | -             | 1          |
| <b>PC18.</b> perform research and development (R&D) to improvements                      | 2            | 3               | -             | 1          |
| <b>PC19.</b> identify broad material knowledge to reduce cost                            | 2            | 2               | -             | -          |
| <b>PC20.</b> perform the working principle of machines to improve UPH                    | 2            | 2               | -             | -          |
| <b>PC21.</b> prepare the design of experiments (DOE) expertise                           | 2            | 2               | -             | -          |
| <b>PC22.</b> knowledge of running statistical tools such as (Joint Manpower Program) JMP | 2            | 2               | -             | -          |
| <b>PC23.</b> perform regular interaction with the customer, supplier, and internal teams | 1            | 2               | -             | -          |
| <b>PC24.</b> knowledge of Auto CAD generated designs                                     | 1            | 2               | -             | -          |
| <b>NOS Total</b>   | <b>40</b>    | <b>50</b>       | -             | <b>10</b>  |



## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |                                 |
|----------------------------|---------------------------------|
| <b>NOS Code</b>            | ELE/N0137                       |
| <b>NOS Name</b>            | Cost & Productivity Improvement |
| <b>Sector</b>              | Electronics                     |
| <b>Sub-Sector</b>          | Semiconductor & Components      |
| <b>Occupation</b>          | Production-S&C                  |
| <b>NSQF Level</b>          | 5                               |
| <b>Credits</b>             | TBD                             |
| <b>Version</b>             | 1.0                             |
| <b>Last Reviewed Date</b>  | 31/03/2022                      |
| <b>Next Review Date</b>    | 31/07/2025                      |
| <b>NSQF Clearance Date</b> | 31/03/2022                      |

## Qualification Pack

### ELE/N0138: Back Grinding Design & Verification

#### Description

The OS unit is about understanding of stacking structure and verify design.

#### Scope

The scope covers the following :

- Design Creation for Back Grinding
- Understanding of Wafer Grinding Criteria
- Design Verification

#### Elements and Performance Criteria

##### *Design Creation for Back Grinding*

To be competent, the user/individual on the job must be able to:

- PC1.** auto CAD or equivalent design tool knowledge
- PC2.** knowledge of Semiconductor Material Used in Wafer Fabrication
- PC3.** knowledge of wafer fabrication process
- PC4.** support Design team to create an Optimized Product
- PC5.** should be able to do the reverse analysis to get specifications

##### *Understanding of Wafer Grinding Criteria*

To be competent, the user/individual on the job must be able to:

- PC6.** understanding of Critical and Normal dimensions Requirements that meet customer's final product specification
- PC7.** define the dimension's specification to meet customer requirements
- PC8.** knowledge of Joint Electron Device Engineering Council (JEDEC) standard
- PC9.** how to read customer POD
- PC10.** selection of grinding wheel
- PC11.** participate in Designing Keep out zone and minimum final grinding thickness

##### *Design Verification*

To be competent, the user/individual on the job must be able to:

- PC12.** verifying package dimension based on wafer geometry parameters
- PC13.** verifying scrub/street width profile
- PC14.** responsibility of Verifying Grinding wheel drawing
- PC15.** verify magazine drawing
- PC16.** verify cassette drawing

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

## Qualification Pack

- KU1.** the use of Auto CAD and other equivalent design tools
- KU2.** the wafer structure and processing, and wire material properties
- KU3.** the importance of determining the customer requirements and collecting data from competitors' specs
- KU4.** how to perform reverse analysis to get the die to attach and wire bonding specifications
- KU5.** the importance of identifying the critical and normal dimension requirements as per the customer requirements
- KU6.** the importance and process of defining the dimension specifications to meet the customer requirements
- KU7.** the Joint Electron Device Engineering Council (JEDEC) standard
- KU8.** the customer bonding diagram
- KU9.** the importance of specifying the wire bonding material that fulfils the bonding drawing and electrical, mechanical, and thermal specifications
- KU10.** how to perform drawing activities bonding drawing
- KU11.** how to verify the die-attach staking structure
- KU12.** how to verify rubber tip for die attach and capillary for wire bonding drawing
- KU13.** how to identify magazine drawing and cassette drawing

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain the record of work-related observations
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** communicate politely and professionally
- GS4.** listen attentively to understand the information or instructions being given
- GS5.** co-ordinate with the co-workers to achieve the work objectives
- GS6.** plan and schedule tasks to achieve work efficiency
- GS7.** identify possible disruptions to work and take preventive measures
- GS8.** evaluate all possible solutions to a problem to select the best one
- GS9.** take quick decisions to deal with workplace emergencies or accidents

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes  | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| <i>Design Creation for Back Grinding</i>  | <b>14</b>    | <b>18</b>       | -             | <b>5</b>   |
| <b>PC1.</b> auto CAD or equivalent design tool knowledge  | 4            | 6               | -             | 1          |
| <b>PC2.</b> knowledge of Semiconductor Material Used in Wafer Fabrication   | 4            | 6               | -             | 1          |
| <b>PC3.</b> knowledge of wafer fabrication process  | 2            | 2               | -             | 1          |
| <b>PC4.</b> support Design team to create an Optimized Product  | 2            | 2               | -             | 1          |
| <b>PC5.</b> should be able to do the reverse analysis to get specifications   | 2            | 2               | -             | 1          |
| <i>Understanding of Wafer Grinding Criteria</i>   | <b>18</b>    | <b>22</b>       | -             | <b>3</b>   |
| <b>PC6.</b> understanding of Critical and Normal dimensions Requirements that meet customer's final product specification | 4            | 6               | -             | 1          |
| <b>PC7.</b> define the dimension's specification to meet customer requirements  | 4            | 6               | -             | 1          |
| <b>PC8.</b> knowledge of Joint Electron Device Engineering Council (JEDEC) standard                                       | 4            | 4               | -             | 1          |
| <b>PC9.</b> how to read customer POD  | 2            | 2               | -             | -          |
| <b>PC10.</b> selection of grinding wheel  | 2            | 2               | -             | -          |
| <b>PC11.</b> participate in Designing Keep out zone and minimum final grinding thickness                                  | 2            | 2               | -             | -          |
| <i>Design Verification</i>  | <b>8</b>     | <b>10</b>       | -             | <b>2</b>   |
| <b>PC12.</b> verifying package dimension based on wafer geometry parameters   | 2            | 2               | -             | 1          |
| <b>PC13.</b> verifying scrub/street width profile   | 2            | 2               | -             | 1          |
| <b>PC14.</b> responsibility of Verifying Grinding wheel drawing   | 2            | 2               | -             | -          |
| <b>PC15.</b> verify magazine drawing  | 1            | 2               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|----------------------------------|--------------|-----------------|---------------|------------|
| PC16. verify cassette drawing    | 1            | 2               | -             | -          |
| <b>NOS Total</b>                 | <b>40</b>    | <b>50</b>       | <b>-</b>      | <b>10</b>  |

## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |                                     |
|----------------------------|-------------------------------------|
| <b>NOS Code</b>            | ELE/N0138                           |
| <b>NOS Name</b>            | Back Grinding Design & Verification |
| <b>Sector</b>              | Electronics                         |
| <b>Sub-Sector</b>          | Semiconductor & Components          |
| <b>Occupation</b>          | Production-S&C                      |
| <b>NSQF Level</b>          | 5                                   |
| <b>Credits</b>             | TBD                                 |
| <b>Version</b>             | 1.0                                 |
| <b>Last Reviewed Date</b>  | 31/03/2022                          |
| <b>Next Review Date</b>    | 31/07/2025                          |
| <b>NSQC Clearance Date</b> | 31/03/2022                          |

## Qualification Pack

### ELE/N0139: Supply Chain of Machine and Tools

#### Description

The OS unit is about buy machines and acceptance of tests at manufacturer's site.

#### Scope

The scope covers the following :

- Factory Acceptance test at equipment manufacturer site for Back Grinding
- Site Acceptance test at product manufacturer site for Back Grinding
- Consumable and Raw Material Qualification

#### Elements and Performance Criteria

##### *Factory Acceptance test at equipment manufacturer site for Back Grinding*

To be competent, the user/individual on the job must be able to:

- PC1.** prepare File Allocation Table (FAT) report creation
- PC2.** identify all specifications as per organisation standards
- PC3.** identify general machine specification (operation, main controller, the main panel should function as per requirements given to manufacturer)
- PC4.** prepare all equipment consumables specifications, dimensions and other parameters should be clearly defined by the process and equipment engineer
- PC5.** prepare equipment, as well as process parameters, should DMAT during testing at a site
- PC6.** prepare sample size required to buy off machines should be defined clearly with specification and CPK Requirements
- PC7.** identify the material through equipment along with the manufacturer's team
- PC8.** prepare a solid report to avoid any future issues
- PC9.** record all approvals as per organisation standards and formats

##### *Site Acceptance test at product manufacturer site for Back Grinding*

To be competent, the user/individual on the job must be able to:

- PC10.** prepare File Allocation Table (FAT) report creation
- PC11.** identify all specifications as per organisation standards
- PC12.** identify general machine specification (operation, main controller, the main panel should function as per requirements given to manufacturer)
- PC13.** prepare all equipment consumables specifications, dimensions and other parameters should be clearly defined by the process and equipment engineer
- PC14.** prepare equipment, as well as process parameters, should DMAT during testing at a site
- PC15.** prepare sample size required to buy off machines should be defined clearly with specification and CPK Requirements
- PC16.** identify the material through equipment along with the manufacturer's team
- PC17.** prepare a solid report to avoid any future issues
- PC18.** record all approvals as per organisation standards and formats

## Qualification Pack

### *Consumable and Raw Material Qualification*

To be competent, the user/individual on the job must be able to:

- PC19.** check out low cost and high reliable raw material and consumables
- PC20.** verify new material to design DOE
- PC21.** collect all the quality and realibility data for each characterization, feasibility, and build the qualification
- PC22.** generate PCN (Process Change Notification)
- PC23.** prepare qualification report and present to management
- PC24.** prepare to release LVM (Low volume Mass Production) & cowork with the production team to make a smooth transition to high volume mass production
- PC25.** determine the knowledge of characterization phase, feasibility phase, customer sampling phase, and qualification phase is required

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1.** how to prepare the File Allocation Table (FAT) report
- KU2.** how to identify all specifications as per the organizational standards
- KU3.** the importance of ensuring the functioning of the main controller and the main panel as per the requirements given to the manufacturer
- KU4.** the importance of ensuring all equipment consumable specifications, dimensions and other parameters are clearly defined by the process and equipment engineer
- KU5.** the importance and process of preparing the equipment and process parameters
- KU6.** the importance of defining and preparing sample size required to buy off machines as per the specifications and CPK Requirements
- KU7.** the importance of preparing a comprehensive report to avoid any future issues
- KU8.** the importance of recording all approvals in the appropriate formats as per the organizational standards
- KU9.** the importance of ensuring the functioning of the main controller and the main panel as per requirements given to the manufacturer
- KU10.** the importance of preparing the equipment consumables according to the specifications, dimensions and other parameters defined by the process and equipment engineer
- KU11.** how to prepare the sample size required to buy off machines and the importance of ensuring it is defined clearly according to the specifications and CPK requirements
- KU12.** the importance of using low cost and highly reliable raw material and consumables
- KU13.** how to verify new material to design DOE
- KU14.** the process of collecting the quality and reliability data for each characterization, feasibility, and building the qualification
- KU15.** how to generate the Process Change Notification (PCN)
- KU16.** the process of transitioning from low volume mass production to high volume mass production
- KU17.** the characterization phase, feasibility phase, customer sampling phase, and qualification phase is required





## Qualification Pack

### Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/ accidents

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes  | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| <i>Factory Acceptance test at equipment manufacturer site for Back Grinding</i>   | <b>16</b>    | <b>20</b>       | -             | <b>4</b>   |
| <b>PC1.</b> prepare File Allocation Table (FAT) report creation   | 2            | 3               | -             | 1          |
| <b>PC2.</b> identify all specifications as per organisation standards   | 2            | 3               | -             | 1          |
| <b>PC3.</b> identify general machine specification (operation, main controller, the main panel should function as per requirements given to manufacturer)     | 2            | 2               | -             | 1          |
| <b>PC4.</b> prepare all equipment consumables specifications, dimensions and other parameters should be clearly defined by the process and equipment engineer | 2            | 2               | -             | -          |
| <b>PC5.</b> prepare equipment, as well as process parameters, should DMAT during testing at a site  | 2            | 2               | -             | -          |
| <b>PC6.</b> prepare sample size required to buy off machines should be defined clearly with specification and CPK Requirements                                | 2            | 2               | -             | 1          |
| <b>PC7.</b> identify the material through equipment along with the manufacturer's team  | 2            | 2               | -             | -          |
| <b>PC8.</b> prepare a solid report to avoid any future issues   | 1            | 2               | -             | -          |
| <b>PC9.</b> record all approvals as per organisation standards and formats  | 1            | 2               | -             | -          |
| <i>Site Acceptance test at product manufacturer site for Back Grinding</i>  | <b>16</b>    | <b>20</b>       | -             | <b>5</b>   |
| <b>PC10.</b> prepare File Allocation Table (FAT) report creation  | 2            | 3               | -             | 1          |
| <b>PC11.</b> identify all specifications as per organisation standards  | 2            | 3               | -             | 1          |

### Qualification Pack

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <b>PC12.</b> identify general machine specification (operation, main controller, the main panel should function as per requirements given to manufacturer)     | 2            | 2               | -             | -          |
| <b>PC13.</b> prepare all equipment consumables specifications, dimensions and other parameters should be clearly defined by the process and equipment engineer | 2            | 2               | -             | 1          |
| <b>PC14.</b> prepare equipment, as well as process parameters, should DMAT during testing at a site  | 2            | 2               | -             | 1          |
| <b>PC15.</b> prepare sample size required to buy off machines should be defined clearly with specification and CPK Requirements                                | 2            | 2               | -             | 1          |
| <b>PC16.</b> identify the material through equipment along with the manufacturer's team  | 2            | 2               | -             | -          |
| <b>PC17.</b> prepare a solid report to avoid any future issues   | 1            | 2               | -             | -          |
| <b>PC18.</b> record all approvals as per organisation standards and formats  | 1            | 2               | -             | -          |
| <b>Consumable and Raw Material Qualification</b>   | <b>8</b>     | <b>10</b>       | <b>-</b>      | <b>1</b>   |
| <b>PC19.</b> check out low cost and high reliable raw material and consumables   | 2            | 2               | -             | 1          |
| <b>PC20.</b> verify new material to design DOE   | 1            | 2               | -             | -          |
| <b>PC21.</b> collect all the quality and realibility data for each characterization, feasibility, and build the qualification                                  | 1            | 2               | -             | -          |
| <b>PC22.</b> generate PCN (Process Change Notification)  | 1            | 1               | -             | -          |
| <b>PC23.</b> prepare qualification report and present to management  | 1            | 1               | -             | -          |
| <b>PC24.</b> prepare to release LVM (Low volume Mass Production) & cowork with the production team to make a smooth transition to high volume mass production  | 1            | 1               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes  | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| <b>PC25.</b> determine the knowledge of characterization phase, feasibility phase, customer sampling phase, and qualification phase is required | 1            | 1               | -             | -          |
| <b>NOS Total</b>  | <b>40</b>    | <b>50</b>       | <b>-</b>      | <b>10</b>  |



## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |                                   |
|----------------------------|-----------------------------------|
| <b>NOS Code</b>            | ELE/N0139                         |
| <b>NOS Name</b>            | Supply Chain of Machine and Tools |
| <b>Sector</b>              | Electronics                       |
| <b>Sub-Sector</b>          | Semiconductor & Components        |
| <b>Occupation</b>          | Production-S&C                    |
| <b>NSQF Level</b>          | 5                                 |
| <b>Credits</b>             | TBD                               |
| <b>Version</b>             | 1.0                               |
| <b>Last Reviewed Date</b>  | 31/03/2022                        |
| <b>Next Review Date</b>    | 31/07/2025                        |
| <b>NSQC Clearance Date</b> | 31/03/2022                        |

## Qualification Pack

### ELE/N9905: Work effectively at the workplace

#### Description

This unit is about the communicating and managing work effectively at the workplace as well as taking measures to enhance own competence and working in a disciplined and ethical manner.

#### Scope

The scope covers the following :

- Communicate effectively at the workplace
- Work effectively
- Maintain and enhance professional competence
- Work in a disciplined and ethical manner
- Uphold social diversity at the workplace

#### Elements and Performance Criteria

##### *Communicate effectively at the workplace*

To be competent, the user/individual on the job must be able to:

- PC1.** exchange information and instruction with colleagues, and seek clarifications and feedback as necessary
- PC2.** assist colleagues where required
- PC3.** follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)
- PC4.** document and share all relevant information with stakeholders in agreed formats and as per agreed timelines

##### *Work effectively*

To be competent, the user/individual on the job must be able to:

- PC5.** identify and obtain clarity regarding organisational, team and own goals and targets
- PC6.** prioritise and plan work in order to achieve goals and targets
- PC7.** monitor own and team performance as per agreed plan
- PC8.** complete duties accurately, systematically and within required timeframes
- PC9.** express emotions appropriately at the workplace and manage own response to heightened emotions
- PC10.** maintain orderliness and cleanliness in the work area

##### *Maintain and enhance professional competence*

To be competent, the user/individual on the job must be able to:

- PC11.** identify own strengths and weaknesses in relation to goals and targets
- PC12.** adapt self, service, or product to meet success criteria
- PC13.** seek and select opportunities for continuous professional development
- PC14.** formulate a professional development plan to enhance capabilities

## Qualification Pack

- PC15.** build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations
- PC16.** examine developments and trends in field of work and their potential impact on work
- PC17.** take feedback from peers, supervisors and clients to improve own performance and practices

*Work in a disciplined and ethical manner*

To be competent, the user/individual on the job must be able to:

- PC18.** perform tasks as per workplace standards, organisational policies and legislative requirements
- PC19.** display appropriate professional appearance at the workplace and adhere to the organisational dress code
- PC20.** demonstrate responsible and disciplined behaviour at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behaviour at all times, adopting environment- friendly practices, etc.
- PC21.** identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution
- PC22.** protect the rights of the client and organisation when delivering services
- PC23.** ensure services are delivered equally to all clients regardless of personal and cultural beliefs
- PC24.** operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities
- PC25.** follow organisational guidelines and legal requirements on disclosure and confidentiality

*Uphold social diversity at the workplace*

To be competent, the user/individual on the job must be able to:

- PC26.** recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes
- PC27.** identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace
- PC28.** use inclusive or neutral language and gestures in all interactions
- PC29.** respect the personal and professional space of others
- PC30.** access grievance redressal mechanisms as per legislations

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** organisation's policies on dress code, workplace timings, workplace behaviour, performance management, incentives, delivery standards, information security, etc.
- KU2.** organizational hierarchy and escalation matrix
- KU3.** importance of the individual's role in the workflow
- KU4.** organisational norms on health, safety and sustainability
- KU5.** work area inspection procedures and practices
- KU6.** professional etiquette and grooming

## Qualification Pack

- KU7.** communication etiquette across communicative mediums (online, digital, and in-person) including strategies/methods for sharing information, documentation, and providing and receiving feedback
- KU8.** importance of self-evaluations and developing a continuous learning and professional development plan
- KU9.** developments and trends impacting professional practice
- KU10.** importance of taking and using feedback from colleagues and clients to identify and introduce improvements in work performance
- KU11.** professional ethics and workplace norms on reporting and/or penalizing unethical behaviour and practices.
- KU12.** guidelines and legal requirements on disclosure, confidentiality, and conflicts of interest
- KU13.** strategies for collaboration with colleagues and clients.
- KU14.** professional responses and strategies against inappropriate language or behaviour toward self and others
- KU15.** Implicit bias (based on gender, disability, class, caste, colour, race, culture, religion, etc.) and its consequences in the workplace
- KU16.** organizational guidelines, prevalent legislations and accessibility norms and processes to support PwDs at the workplace
- KU17.** strategies for time, effort and resource allocation towards the goals.
- KU18.** basic concepts of work productivity including waste reduction, efficient material usage and optimization of time

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** complete documentation and forms such as work orders, invoices maintenance records activity logs, attendance sheets as per organizational format in English and/or local language
- GS2.** write basic accident or incident report accurately in an appropriate format
- GS3.** read warnings, instructions and other text material on product labels, components, etc. and relevant signages, warnings, labels or descriptions on equipment, etc. while carrying out work activities
- GS4.** convey and share technical information clearly using appropriate language
- GS5.** clarify task-related information
- GS6.** liaise with authorities and supervisors as per organizational protocol
- GS7.** listen, speak, and write in an inclusive, respectful manner in line with organizational protocol
- GS8.** seek clarification from immediate supervisor or responsible authority or exercise most appropriate solutions to safety breaches at work
- GS9.** report to the supervisor and when to deal with a colleague depending on the type of concern
- GS10.** deliver product to next work process on time
- GS11.** improve work process and report potential areas of delays and disruptions
- GS12.** communicate problems appropriately to others
- GS13.** identify symptoms of the fault to the cause of the problem and resolve, otherwise seek assistance and support from other sources to solve the problem



## Qualification Pack

- GS14.** anticipate and avoid hazards that may occur during repairs because of tools, materials used or repair processes
- GS15.** complete tasks efficiently and accurately within stipulated time
- GS16.** appreciate and respect social diversity in all professional settings
- GS17.** develop awareness and accountability for perspectives on gender, disabilities, and socio-cultural issues leading to discrimination, bias, or harassment at the workplace
- GS18.** maintain positive and effective relationships with colleagues and customers

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <i>Communicate effectively at the workplace</i>  | <b>5</b>     | <b>13</b>       | -             | -          |
| <b>PC1.</b> exchange information and instruction with colleagues, and seek clarifications and feedback as necessary                | 1            | 3               | -             | -          |
| <b>PC2.</b> assist colleagues where required   | 1            | 3               | -             | -          |
| <b>PC3.</b> follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person) | 1            | 4               | -             | -          |
| <b>PC4.</b> document and share all relevant information with stakeholders in agreed formats and as per agreed timelines            | 2            | 3               | -             | -          |
| <i>Work effectively</i>  | <b>6</b>     | <b>13</b>       | -             | -          |
| <b>PC5.</b> identify and obtain clarity regarding organisational, team and own goals and targets                                   | 1            | 2               | -             | -          |
| <b>PC6.</b> prioritise and plan work in order to achieve goals and targets   | 1            | 2               | -             | -          |
| <b>PC7.</b> monitor own and team performance as per agreed plan  | 1            | 2               | -             | -          |
| <b>PC8.</b> complete duties accurately, systematically and within required timeframes  | 1            | 2               | -             | -          |
| <b>PC9.</b> express emotions appropriately at the workplace and manage own response to heightened emotions                         | 1            | 2               | -             | -          |
| <b>PC10.</b> maintain orderliness and cleanliness in the work area   | 1            | 3               | -             | -          |
| <i>Maintain and enhance professional competence</i>  | <b>8</b>     | <b>7</b>        | -             | -          |
| <b>PC11.</b> identify own strengths and weaknesses in relation to goals and targets  | 1            | 1               | -             | -          |
| <b>PC12.</b> adapt self, service, or product to meet success criteria  | 1            | 1               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <b>PC13.</b> seek and select opportunities for continuous professional development   | 1            | 1               | -             | -          |
| <b>PC14.</b> formulate a professional development plan to enhance capabilities   | 2            | 1               | -             | -          |
| <b>PC15.</b> build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations  | 1            | 1               | -             | -          |
| <b>PC16.</b> examine developments and trends in field of work and their potential impact on work   | 1            | 1               | -             | -          |
| <b>PC17.</b> take feedback from peers, supervisors and clients to improve own performance and practices  | 1            | 1               | -             | -          |
| <i>Work in a disciplined and ethical manner</i>  | <b>11</b>    | <b>16</b>       | -             | -          |
| <b>PC18.</b> perform tasks as per workplace standards, organisational policies and legislative requirements  | 2            | 2               | -             | -          |
| <b>PC19.</b> display appropriate professional appearance at the workplace and adhere to the organisational dress code  | 1            | 2               | -             | -          |
| <b>PC20.</b> demonstrate responsible and disciplined behaviour at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behaviour at all times, adopting environment- friendly practices, etc. | 1            | 2               | -             | -          |
| <b>PC21.</b> identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution  | 2            | 2               | -             | -          |
| <b>PC22.</b> protect the rights of the client and organisation when delivering services  | 1            | 2               | -             | -          |
| <b>PC23.</b> ensure services are delivered equally to all clients regardless of personal and cultural beliefs  | 1            | 2               | -             | -          |
| <b>PC24.</b> operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities   | 2            | 2               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes  | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| <b>PC25.</b> follow organisational guidelines and legal requirements on disclosure and confidentiality  | 1            | 2               | -             | -          |
| <i>Uphold social diversity at the workplace</i>   | <b>10</b>    | <b>11</b>       | -             | -          |
| <b>PC26.</b> recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes | 2            | 2               | -             | -          |
| <b>PC27.</b> identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace                               | 2            | 2               | -             | -          |
| <b>PC28.</b> use inclusive or neutral language and gestures in all interactions   | 2            | 2               | -             | -          |
| <b>PC29.</b> respect the personal and professional space of others  | 2            | 2               | -             | -          |
| <b>PC30.</b> access grievance redressal mechanisms as per legislations  | 2            | 3               | -             | -          |
| <b>NOS Total</b>  | <b>40</b>    | <b>60</b>       | -             | -          |

## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |                                    |
|----------------------------|------------------------------------|
| <b>NOS Code</b>            | ELE/N9905                          |
| <b>NOS Name</b>            | Work effectively at the workplace  |
| <b>Sector</b>              | Electronics                        |
| <b>Sub-Sector</b>          | Generic                            |
| <b>Occupation</b>          | Generic - Organizational Behaviour |
| <b>NSQF Level</b>          | 4                                  |
| <b>Credits</b>             | TBD                                |
| <b>Version</b>             | 2.0                                |
| <b>Last Reviewed Date</b>  | 24/02/2022                         |
| <b>Next Review Date</b>    | 30/12/2026                         |
| <b>NSQC Clearance Date</b> | 30/12/2021                         |

## Qualification Pack

### ELE/N1002: Apply health and safety practices at the workplace

#### Description

This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace.

#### Scope

The scope covers the following :

- Deal with workplace hazards
- Apply fire safety practices
- Follow emergencies, rescue and first-aid procedures
- Effective waste management/recycling practices

#### Elements and Performance Criteria

##### *Deal with workplace hazards*

To be competent, the user/individual on the job must be able to:

- PC1.** identify job-site hazards and possible causes of accident in the workplace
- PC2.** perform work complying to organizational safe working practices and observing hazard signs displayed on containers, equipment and in various work areas such as inside buildings, in open areas and public spaces, etc.
- PC3.** use appropriate personal protective equipment (PPE) for specific tasks and work conditions, contaminant (concentration w.r.t air) requirements and severity of hazard while conforming to the Indian/International standards
- PC4.** follow standard safety procedures while handling tool/ ,equipment, hazardous substances and while working in hazardous environments
- PC5.** dispose electronic waste (such as toxins; metals such as lead, cadmium, barium; flame retardant plastics, welding slag etc.) as per industry approved techniques
- PC6.** avoid damage of components due to negligence in electrostatic discharge (ESD) procedures
- PC7.** locate general health and safety equipment in the workplace such as fire extinguishers; first aid equipment; safety instruments, clothing and installations (fire exits, exhaust fans)
- PC8.** maintain appropriate posture while handling heavy objects
- PC9.** apply good housekeeping practices at all times

##### *Apply fire safety practices*

To be competent, the user/individual on the job must be able to:

- PC10.** take preventive measures to prevent fire hazards
- PC11.**
  - use appropriate fire extinguishers for different types of fires
  - Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no I
- PC12.** exhibit rescue and first-aid techniques in case of fire or electrocution

## Qualification Pack

### *Follow emergencies, rescue and first-aid procedures*

To be competent, the user/individual on the job must be able to:

- PC13.** administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning etc.
- PC14.** administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock,
- PC15.** participate regularly in emergency procedures such as raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work
- PC16.** use correct method to move injured people and others during an emergency

### *Effective waste management/recycling practices*

To be competent, the user/individual on the job must be able to:

- PC17.** identify recyclable and non-recyclable, and hazardous waste generated
- PC18.** segregate waste into different categories
- PC19.** ensure disposal of non-recyclable waste appropriately
- PC20.** deposit non-recyclable and reusable material at identified location
- PC21.** follow processes specified for disposal of hazardous waste

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** importance of working in clean and safe work environment following safety practices and procedures
- KU2.** health and safety roles and responsibilities of relevant personnel within and outside the organisation
- KU3.** key internal and external sources of health and safety information
- KU4.** basic knowledge of electronic devices and related health risks
- KU5.** meaning of hazards and risks
- KU6.** various types of health and safety hazards commonly present in the work environment such as physical hazards, electrical hazards, chemical hazards, fire hazards, equipment related hazards, health hazards, etc.
- KU7.** methods of accident prevention
- KU8.** importance of using protective clothing/equipment while working
- KU9.** general principles for identifying and controlling health and safety risks
- KU10.** main hazards and preventive as well as control measures while working with different types of equipment
- KU11.** importance of carrying out electrical and non-electrical isolation to prevent hazards from loss of machine/system/process control
- KU12.** main hazards and preventive as well as control measures when working with electrical systems or using electrical equipment
- KU13.** forms and classifications of hazardous substances
- KU14.** safe working practices while working at various hazardous sites
- KU15.** prevention and control measures to reduce risks from exposure to hazardous substances

## Qualification Pack

- KU16.** health effects associated with exposure to noise and vibration and the appropriate control measures
- KU17.** precautionary activities to prevent the fire accident
- KU18.** various causes of fire such as heating of metal, spontaneous ignition, sparking, electrical eating, loose fires (smoking, welding, etc.) chemical fires etc.
- KU19.** techniques of using the different fire extinguishers
- KU20.** different methods and material to extinguish fires
- KU21.** different materials used for extinguishing fire such as sand, water, foam, CO<sub>2</sub>, dry powder
- KU22.** rescue techniques used during a fire hazard
- KU23.** various types of safety signs and their meaning
- KU24.** basic first aid treatment relevant to the common work place injuries e.g. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries
- KU25.** contents of written accident report
- KU26.** potential injuries and ill health associated with incorrect handling of tools and equipment
- KU27.** safe lifting and carrying practices
- KU28.** potential impact to a person who is moved incorrectly
- KU29.** personal safety, health and dignity issues relating to the movement of a person by others
- KU30.** ESD measures and 5S
- KU31.** efficient utilization and management of material and water
- KU32.** ways to recognize common electrical problems and practices of conserving electricity
- KU33.** usage of different colours of dustbins, categorization of waste into dry, wet, recyclable, nonrecyclable and items of single-use plastics
- KU34.** organization's procedure for minimizing waste
- KU35.** waste management and methods of waste disposal
- KU36.** common sources of pollution and ways to minimize it
- KU37.** names, contact information and location of people responsible for health and safety in the workplace
- KU38.** location of documents and equipment for health and safety compliance/practices in the workplace
- KU39.** safety notices, signs and instructions at workplace

## Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** interpret general health and safety guidelines labels, charts, signages
- GS2.** read operation manuals
- GS3.** write health and safety compliance report
- GS4.** write an accident/incident report in local language or English
- GS5.** provide an emergency or safety incident brief to seniors or relevant authorities in a calm, clear and to-the-point manner
- GS6.** communicate general health and safety guidelines to colleagues/co-workers



## Qualification Pack

- GS7.** communicate appropriately with co-workers in order to clarify instructions and other issues
- GS8.** act in case of any potential hazards observed in the work place
- GS9.** plan and organize their own work schedule, work area, tools, equipment in compliance with organizational policies for health, safety and security
- GS10.** take adequate measures to ensure the safety of clients and visitors at the workplace
- GS11.** identify immediate or temporary solutions to resolve delays
- GS12.** evaluate the work area for health and safety risks or hazards
- GS13.** use cause and effect relations to anticipate potential issues, problems and their solution in the work area related to safety
- GS14.** recognise emergency and potential emergency situations
- GS15.** protect self and others from a health and safety risk or hazard
- GS16.** communicate and collaborate to incorporate sustainable practices (greening) in workplace processes
- GS17.** record data on waste disposal at workplace

## Qualification Pack

### Assessment Criteria

| Assessment Criteria for Outcomes   | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| <i>Deal with workplace hazards</i>   | <b>20</b>    | <b>31</b>       | -             | -          |
| <b>PC1.</b> identify job-site hazards and possible causes of accident in the workplace   | 2            | 3               | -             | -          |
| <b>PC2.</b> perform work complying to organizational safe working practices and observing hazard signs displayed on containers, equipment and in various work areas such as inside buildings, in open areas and public spaces, etc.      | 3            | 4               | -             | -          |
| <b>PC3.</b> use appropriate personal protective equipment (PPE) for specific tasks and work conditions, contaminant (concentration w.r.t air) requirements and severity of hazard while conforming to the Indian/International standards | 3            | 4               | -             | -          |
| <b>PC4.</b> follow standard safety procedures while handling tool/ ,equipment, hazardous substances and while working in hazardous environments  | 3            | 4               | -             | -          |
| <b>PC5.</b> dispose electronic waste (such as toxins; metals such as lead, cadmium, barium; flame retardant plastics, welding slag etc.) as per industry approved techniques   | 2            | 4               | -             | -          |
| <b>PC6.</b> avoid damage of components due to negligence in electrostatic discharge (ESD) procedures   | 2            | 3               | -             | -          |
| <b>PC7.</b> locate general health and safety equipment in the workplace such as fire extinguishers; first aid equipment; safety instruments, clothing and installations (fire exits, exhaust fans)                                       | 2            | 3               | -             | -          |
| <b>PC8.</b> maintain appropriate posture while handling heavy objects  | 1            | 3               | -             | -          |
| <b>PC9.</b> apply good housekeeping practices at all times   | 2            | 3               | -             | -          |
| <i>Apply fire safety practices</i>   | <b>4</b>     | <b>9</b>        | -             | -          |
| <b>PC10.</b> take preventive measures to prevent fire hazards  | 2            | 3               | -             | -          |

### Qualification Pack

| Assessment Criteria for Outcomes  | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|--------------|-----------------|---------------|------------|
| <b>PC11.</b> <ul style="list-style-type: none"> <li>• use appropriate fire extinguishers for different types of fires</li> <li>• Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no I</li> </ul> | 1            | 3               | -             | -          |
| <b>PC12.</b> exhibit rescue and first-aid techniques in case of fire or electrocution   | 1            | 3               | -             | -          |
| <i>Follow emergencies, rescue and first-aid procedures</i>  | <b>6</b>     | <b>13</b>       | -             | -          |
| <b>PC13.</b> administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning etc.  | 1            | 3               | -             | -          |
| <b>PC14.</b> administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock,   | 1            | 2               | -             | -          |
| <b>PC15.</b> participate regularly in emergency procedures such as raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work   | 2            | 4               | -             | -          |
| <b>PC16.</b> use correct method to move injured people and others during an emergency   | 2            | 4               | -             | -          |
| <i>Effective waste management/recycling practices</i>   | <b>5</b>     | <b>12</b>       | -             | -          |
| <b>PC17.</b> identify recyclable and non-recyclable, and hazardous waste generated  | 1            | 3               | -             | -          |
| <b>PC18.</b> segregate waste into different categories  | 1            | 2               | -             | -          |
| <b>PC19.</b> ensure disposal of non-recyclable waste appropriately  | 1            | 2               | -             | -          |
| <b>PC20.</b> deposit non-recyclable and reusable material at identified location  | 1            | 3               | -             | -          |

## Qualification Pack

| Assessment Criteria for Outcomes                                 | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|--|--------------|-----------------|---------------|------------|
| PC21. follow processes specified for disposal of hazardous waste | 1            | 2               | -             | -          |
| <b>NOS Total</b>   | <b>35</b>    | <b>65</b>       | <b>-</b>      | <b>-</b>   |

## Qualification Pack

### National Occupational Standards (NOS) Parameters

|                            |  |
|----------------------------|--|
| <b>NOS Code</b>            | ELE/N1002  |
| <b>NOS Name</b>            | Apply health and safety practices at the workplace |
| <b>Sector</b>              | Electronics  |
| <b>Sub-Sector</b>          | Generic  |
| <b>Occupation</b>          | Generic - Health Safety                            |
| <b>NSQF Level</b>          | 4  |
| <b>Credits</b>             | TBD  |
| <b>Version</b>             | 3.0  |
| <b>Last Reviewed Date</b>  | 24/02/2022   |
| <b>Next Review Date</b>    | 03/05/2026   |
| <b>NSQC Clearance Date</b> | 03/05/2023   |

## Assessment Guidelines and Assessment Weightage

### Assessment Guidelines

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. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below.)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

### Minimum Aggregate Passing % at QP Level : 70

## Qualification Pack

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

### Assessment Weightage

Compulsory NOS

| National Occupational Standards                              | Theory Marks | Practical Marks | Project Marks | Viva Marks | Total Marks | Weightage  |
|--|--------------|-----------------|---------------|------------|-------------|------------|
| ELE/N0132.Program Readiness                                  | 40           | 50              | -             | 10         | 100         | 20         |
| ELE/N0137.Cost & Productivity Improvement                    | 40           | 50              | -             | 10         | 100         | 20         |
| ELE/N0138.Back Grinding Design & Verification                | 40           | 50              | -             | 10         | 100         | 20         |
| ELE/N0139.Supply Chain of Machine and Tools                  | 40           | 50              | -             | 10         | 100         | 20         |
| ELE/N9905.Work effectively at the workplace                  | 40           | 60              | -             | -          | 100         | 10         |
| ELE/N1002.Apply health and safety practices at the workplace | 35           | 65              | -             | -          | 100         | 10         |
| <b>Total</b>   | <b>235</b>   | <b>325</b>      | <b>-</b>      | <b>40</b>  | <b>600</b>  | <b>100</b> |

## Qualification Pack

### Acronyms

|             |   |
|-------------|---|
| <b>NOS</b>  | National Occupational Standard(s)               |
| <b>NSQF</b> | National Skills Qualifications Framework        |
| <b>QP</b>   | Qualifications Pack                             |
| <b>TVET</b> | Technical and Vocational Education and Training |

## Qualification Pack

### Glossary

|  |  |
|--|--|
| <b>Sector</b>                                | Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.  |
| <b>Sub-sector</b>                            | Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.   |
| <b>Occupation</b>                            | Occupation is a set of job roles, which perform similar/ related set of functions in an industry.  |
| <b>Job role</b>                              | Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.  |
| <b>Occupational Standards (OS)</b>           | OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts. |
| <b>Performance Criteria (PC)</b>             | Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.  |
| <b>National Occupational Standards (NOS)</b> | NOS are occupational standards which apply uniquely in the Indian context.   |
| <b>Qualifications Pack (QP)</b>              | QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.   |
| <b>Unit Code</b>                             | Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'  |
| <b>Unit Title</b>                            | Unit title gives a clear overall statement about what the incumbent should be able to do.  |
| <b>Description</b>                           | Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.   |
| <b>Scope</b>                                 | Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.  |



## Qualification Pack

|   |  |
|---|--|
| <b>Knowledge and Understanding (KU)</b> | Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.   |
| <b>Organisational Context</b>           | Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.   |
| <b>Technical Knowledge</b>              | Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.   |
| <b>Core Skills/ Generic Skills (GS)</b> | Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles. |
| <b>Electives</b>                        | Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.  |
| <b>Options</b>                          | Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.  |