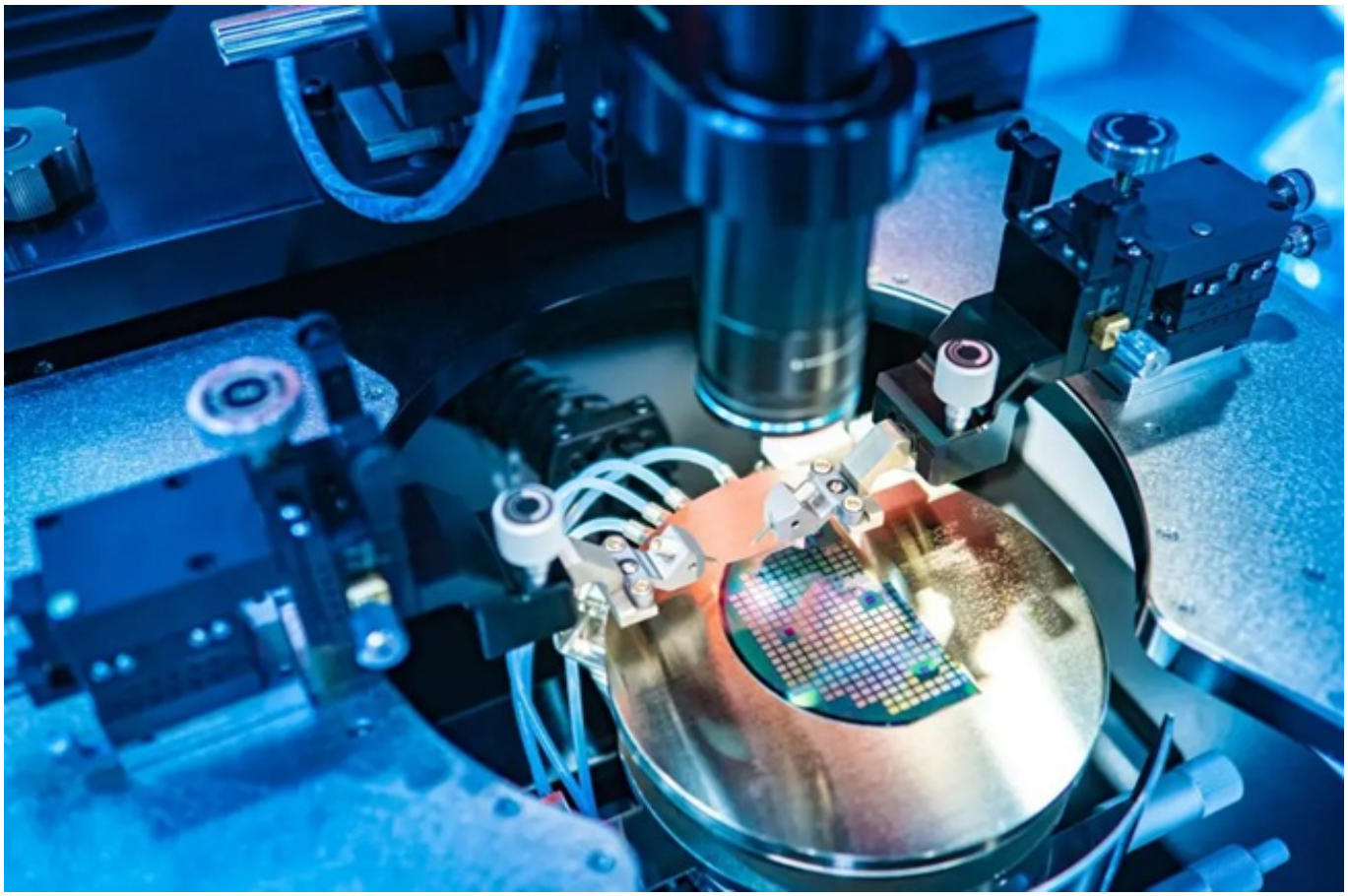
Qualification Pack



Solder Ball Attach - Process Supervisor

QP Code: ELE/Q0127

Version: 3.0

NSQF Level: 5

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

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ELE/Q0127: Solder Ball Attach - Process Supervisor

Brief Job Description

Solder Ball Attach Supervisor works on Program Preparation for Solder Ball Attach Machine and also, he is responsible for Operation of Machine to complete process and deliver to next step of Manufacturing. He also needs to coordinate with other departments for smooth functioning.

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/N0144: Define Recipe & Process Parameters
2. ELE/N0145: Data Analysis & Yield Improvement
3. ELE/N0146: Solder Ball Attachment Design & Verification
4. ELE/N0147: Purchasing of Tools and Consumable Materials
5. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
Country	India
NSQF Level	5
Credits	19
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0101

Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (Physics/ Electronics /Electrical/Mechanical) with 1.5 years of experience Relevant Experience in Semiconductor & Components OR Completed 3 year diploma after 10th (Electronics/Electrical /Mechanical) with 3 Years of experience Relevant Experience in Semiconductor & Components OR Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience Relevant Experience in Semiconductor & Components
Minimum Level of Education for Training in School	10th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	31/10/2025
NSQC Approval Date	08/05/2025
Version	3.0
Reference code on NQR	QG-05-EH-03985-2025-V3-ESSCI
NQR Version	3.0

Remarks:

NA

Qualification Pack

ELE/N0144: Define Recipe & Process Parameters

Description

The NOS unit is about to establish, verify, document, and manage semiconductor packaging process parameters and Standard Operating Procedures (SOPs) to ensure consistent quality and support production readiness

Scope

The scope covers the following :

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

Elements and Performance Criteria

Define Process Parameters

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

PC1. identify the product dimensions as well the strip dimensions

PC2. specify the package outline drawing and strip drawing, Solder Ball dimension, solder ball pad diameter and pitch

PC3. define solder ball material types, stencil, Pad Wetting coverage, bonding strength etc

PC4. set up all process parameters such as speed, stencil height, reflow temperature range, fiducial marks, orientation, vaccume level, AOI Machine 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

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 solder pad size, solder material, Solder Paste Type, Solder Ball Diameter and Pitch, Reflow Temperature & Humidity 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

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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Define Process Parameters	**22**	**26**	**-**	**4**
PC1. identify the product dimensions as well the strip dimensions	-	-	-	-
PC2. specify the package outline drawing and strip drawing, Solder Ball dimension, solder ball pad diameter and pitch	-	-	-	-
PC3. define solder ball material types, stencil, Pad Wetting coverage, bonding strength etc	-	-	-	-
PC4. set up all process parameters such as speed, stencil height, reflow temperature range, fiducial marks, orientation, vaccume level, AOI Machine 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	**8**	**12**	**-**	**2**
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	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	-	-	-	-
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	**5**	**6**	**-**	**2**
PC21. use Automatic Computer-Aided Design (AUTO-CAD) as per organisation standards	-	-	-	-
PC22. prepare Process flow with clear specifications like solder pad size, solder material, Solder Paste Type, Solder Ball Diameter and Pitch, Reflow Temperature & Humidity 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	**5**	**6**	**-**	**2**
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	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC30. prepare daily activity plan	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0144
NOS Name	Define Recipe & Process Parameters
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	5
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

ELE/N0145: Data Analysis & Yield Improvement

Description

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

Scope

The scope covers the following :

- Product Quality
- Yield Tracking
- Yield, Cost, and Productivity Improvement

Elements and Performance Criteria

Product Quality

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

PC1. define all package outlines drawings with specifications

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 Solder Ball Attach 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

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
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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Product Quality	**18**	**20**	**-**	**6**
PC1. define all package outlines drawings with specifications	-	-	-	-
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 Solder Ball Attach 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	**8**	**12**	**-**	**2**
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	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC16. record all failures along with actions to avoid future failure	-	-	-	-
Yield, Cost, and Productivity Improvement	**14**	**18**	**-**	**2**
PC17. prepare strategies for further improvements	-	-	-	-
PC18. perform research and development (R&D) to improvements	-	-	-	-
PC19. identify broad material knowledge to reduce cost	-	-	-	-
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	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0145
NOS Name	Data Analysis & Yield Improvement
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

ELE/N0146: Solder Ball Attachment Design & Verification

Description

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

Scope

The scope covers the following :

- Design Creation
- Understanding of Chip Dimensions
- Design Verification

Elements and Performance Criteria

Design Creation

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 components

PC3. knowledge of process & collect customer requirements

PC4. collect data from competitor’s specs

PC5. should be able to do the reverse analysis to get specifications

Understanding of Chip Dimensions

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 stencil as per Strip outline drawing & Material

PC11. participate in substrate drawing activities for Solder ball dimensions

Design Verification

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

PC12. identify & Verifying package drawing for solder ball

PC13. responsibility of Verifying scrub/street width profile

PC14. responsibility of Verifying blade drawing

PC15. verify magazine drawing

PC16. verify cassette drawing

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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. write work-related notes and maintain relevant 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 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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Design Creation	**14**	**18**	**-**	**5**
PC1. Auto CAD or equivalent design tool knowledge	-	-	-	-
PC2. knowledge of Semiconductor components	-	-	-	-
PC3. knowledge of process & collect customer requirements	-	-	-	-
PC4. collect data from competitor's specs	-	-	-	-
PC5. should be able to do the reverse analysis to get specifications	-	-	-	-
Understanding of Chip Dimensions	**18**	**22**	**-**	**3**
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 stencil as per Strip outline drawing & Material	-	-	-	-
PC11. participate in substrate drawing activities for Solder ball dimensions	-	-	-	-
Design Verification	**8**	**10**	**-**	**2**
PC12. identify & Verifying package drawing for solder ball	-	-	-	-
PC13. responsibility of Verifying scrub/street width profile	-	-	-	-
PC14. responsibility of Verifying blade drawing	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. verify magazine drawing	-	-	-	-
PC16. verify cassette drawing	-	-	-	-
NOS Total	**40**	**50**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0146
NOS Name	Solder Ball Attachment Design & Verification
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

ELE/N0147: Purchasing of Tools and Consumable Materials

Description

The NOS 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 Solder Ball Attach
- Site Acceptance test at product manufacturer site Solder Ball Attach
- Consumable and Raw Material Qualification

Elements and Performance Criteria

Factory Acceptance test at equipment manufacturer site for Solder Ball Attach

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 Solder Ball Attach

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

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 realibity 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

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
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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Factory Acceptance test at equipment manufacturer site for Solder Ball Attach	**16**	**20**	**-**	**4**
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 Solder Ball Attach	**16**	**20**	**-**	**4**
PC10. prepare File Allocation Table (FAT) report creation	-	-	-	-
PC11. identify all specifications as per organisation standards	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	-	-	-	-
Consumable and Raw Material Qualification	**8**	**10**	**-**	**2**
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 realibity 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	-	-	-	-

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

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0147
NOS Name	Purchasing of Tools and Consumable Materials
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

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

PC1. identify employability skills required for jobs in various industries

PC2. identify and explore learning and employability portals

Constitutional values – Citizenship

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

PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.

PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC5. recognize the significance of 21st Century Skills for employment

PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

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

PC7. use basic English for everyday conversation in different contexts, in person and over the telephone

PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

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

PC10. understand the difference between job and career

PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

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

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings

PC13. work collaboratively with others in a team

Diversity & Inclusion

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

PC14. communicate and behave appropriately with all genders and PwD

PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

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

PC16. select financial institutions, products and services as per requirement

PC17. carry out offline and online financial transactions, safely and securely

PC18. identify common components of salary and compute income, expenses, taxes, investments etc

PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

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

PC20. operate digital devices and carry out basic internet operations securely and safely

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively

PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

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

PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

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

PC26. identify different types of customers

PC27. identify and respond to customer requests and needs in a professional manner.

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

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

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

GS3. behave politely and appropriately with all
GS4. how to work in a virtual mode
GS5. perform calculations efficiently
GS6. solve problems effectively
GS7. pay attention to details
GS8. manage time efficiently
GS9. maintain hygiene and sanitization to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**2**	**4**	**-**	**-**
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
Communication Skills	**2**	**2**	**-**	**-**
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**2**	**-**	**-**
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
Financial and Legal Literacy	**2**	**3**	**-**	**-**
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**3**	**4**	**-**	**-**
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Entrepreneurship	**2**	**3**	**-**	**-**
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	**-**	**-**
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

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

(**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/N0144.Define Recipe & Process Parameters	40	50	-	10	100	20
ELE/N0145.Data Analysis & Yield Improvement	40	50	-	10	100	20
ELE/N0146.Solder Ball Attachment Design & Verification	40	50	-	10	100	20
ELE/N0147.Purchasing of Tools and Consumable Materials	40	50	-	10	100	20
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	20
Total	**180**	**230**	**-**	**40**	**450**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	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.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	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.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	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.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	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.
Scope	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.

Knowledge and Understanding (KU)	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.
Organisational Context	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.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	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.
Electives	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.
Options	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.