QUALIFICATION PACK - OCCUPATIONAL STANDARDS FOR INSTRUMENTATION AUTOMATION SURVEILLANCE AND COMMUNICATION INDUSTRY

Contents

What are Occupational Standards(OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualification Pack-PLC Technician

SECTOR: INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION

SUB-SECTOR: Automation

OCCUPATION: PLC Panel designing, testing and troubleshooting

REFERENCE ID: IAS/Q5601

ALIGNED TO: NCO-2015/ NIL

PLC Technician analyses the customers requirements regarding the PLC panels and provides solution to customers for optimized design of panel to be utilized in Process Industry.

Brief Job Description: The individual is responsible for understanding the panel requirement, design the panel dimensions and mountings, test the equipements by basic programming of PLC and troubleshooting any faults in the control panels.

Personal Attributes: The individual must have knowledge of process industry, field instrumentation and expertise in the following project phases like documentation, detailed design generation, implementation, testing and onsite setup. Planning & coordination of project work within deadlines.

Job Details

Qualification Pack Code	**IAS/Q5601**		
Job Role	**PLC Technician**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Sector	**Instrumentation Automation Surveillance & Communication**	**Drafted on**	**15/09/2017**
Sub-sector	**Automation**	**Last reviewed on**	**15/09/2017**
Occupation	**PLC Panel designing, testing and troubleshooting**	**Next review date**	**15/09/2019**
NSQC Clearance on*	**DD/MM/YYYY**		

*** only after clearance from NSQC**

Job Role	**PLC Technician**
Role Description	a. Designing of PLC control panel b. Fabrication of panels c. Testing & Troubleshooting panels d. Installation of control panels onsite
NSQF level	3
Minimum Educational Qualifications	12th Pass, Preferably ITI - Electrical, Electronics, Instrumentation etc.
Maximum Educational Qualifications	NA
Training (Suggested but not mandatory)	Training on Basics PLC.
Minimum Job Entry Age	20 years.
Experience	Experience of minimum six months in Panel designing, Fabrication and wiring of the components in a control panel
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. IAS/N6000 Detailing and procurement of equipment used in PLC Control Panel 2. IAS/N6001 Testing the PLC Control Panel 3. IAS/N6002 Dispatch, Installation and Commissioning of control panel 4. IAS/N2005 Health and Safety in Workplace **Optional:** N.A.
Performance Criteria	As described in the relevant OS units

Definitions

Keywords /Terms	Description
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.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation or an area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Sub-function	Sub-function are sub-activities essential to fulfil in achieving the objectives of the function.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
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 they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance criteria 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.
Qualification 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 qualification pack code.
Unit Code	Unit codeis 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 varialbles 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	Knowledge and understanding are statements which together which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
Organizational Context	Organizational context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Techinical Knowledge	Techinical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

CoreSkills/Generic Skills	Core skills or generic skills 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 the context of the OS, these include communication related skills that are applicable to most job roles.

Acronyms

Keywords /Terms	Description
FAT	Factory Acceptance Test
PLC	Programmable Logic Controller
DCS	Distributed Control System
HMI	Human Machine Interface
SCADA	Supervisory Control And Data Acquisition
NOS	National Occupational Standard(s)
NVQF	National Vocational Qualifications Framework
NSQF	National Skill Qualifications Framework
NVEQF	National Vocational Education Qualifications Framework
QP	Qualification Pack
ESD	Electro Static Discharge

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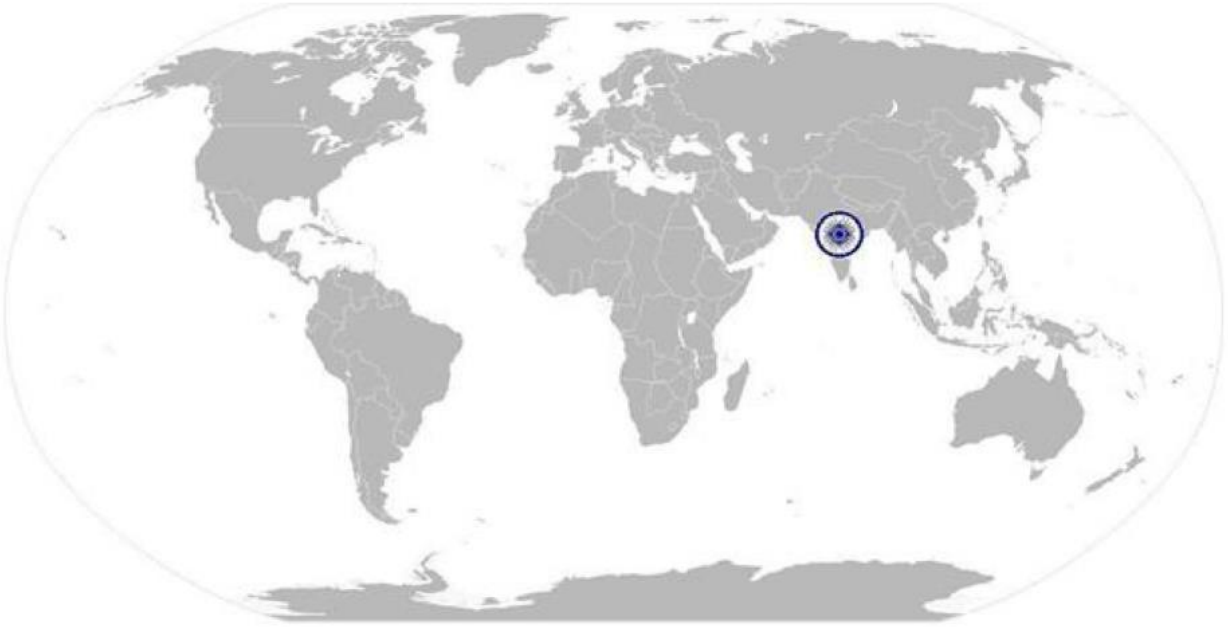
National Occupational Standard



Overview

This unit is about gathering the detail information about the PLC control panel and later procuring the material for the control panel.

IAS/N6000 **Detailing and procurement of equipment used in PLC Control Panel**

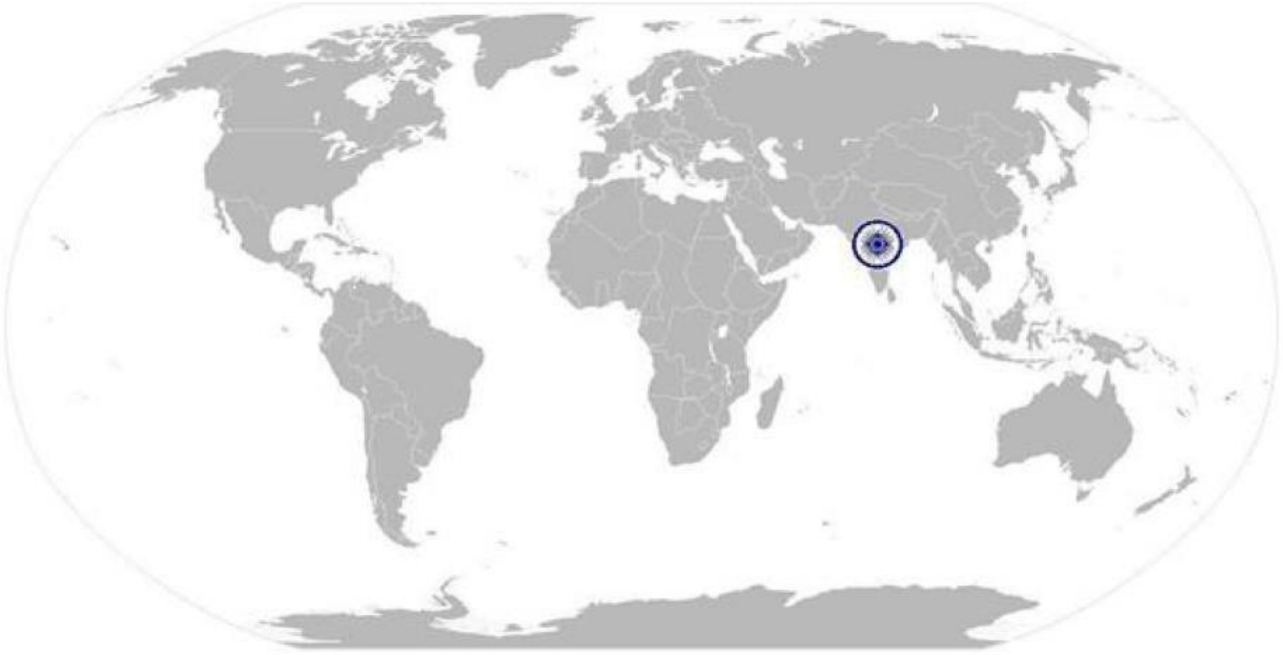
National Occupational Standard

Unit Code	**IAS/N6000**
Unit Title (Task)	**Detailing and procurement of equipment used in PLC Control Panel**
Description	This unit is about gathering the detail information about the PLC control panel and later procuring the material for the control panel.
Scope	This unit/task covers the following: • Detailing the PLC Control Panel functional requirements • Procurement of accessories used in the Control Panel • Examine the Control Panel
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Detailing the PLC Control Panel functional requirements	To be competent, the user/individual on the job must be able to PC1. Identify the customer requirement of the PLC Control Panel PC2. Understand and examine the onsite location where Control Panel will be placed PC3. Interact with Project engineer or customer & understand number of field equipments helping to analyze the size of control panel PC4. Prepare the dimension of control panel with the help of fabricator PC5. Interact with project engineer or customer for Panel HMI mounting & Panel switches and then guiding fabrication team for the cutouts on panel door PC6. Assisting in mounting of components on the mounting plate inside the control panel PC7. Prepare panel fabrication drawing and internal mounting layout drawings with dimensions
Procurement of accessories used in the Control Panel	PC8. Interact with Project engineer to collect the material list regarding PLC modules PC9. Procure PLC modules and accessories required for mounting in panel PC10. Procure panel accessories like wires, ferrules, sleeves, terminal base, fans, tube light etc. PC11. Procure switchgear accessories like push buttons, switches, contactors and relays PC12. Prepare Input Output list and get it approved from Project engineer or customer PC13. Assist draftsman to prepare engineering drawing for the panels and wiring diagrams for field connections PC14. Examine the drawings and get it approved from the Project engineer PC15. Assist and guide wireman for panel wiring
Examine the Control Panel	PC16. Examine panel wiring using continuity test PC17. Examine the Mains power supply unit for powering the PLC Control panel PC18. Examine the wiring of the Digital and Analog IO modules with

	other components inside the panel PC19. Examine special modules if used in panel for advance communications.
Knowledge & Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. Company's code of conduct, organization culture and reporting structure KA2. Company's documentation policy KA3. Company's line of business and production policy KA4. Departments involved with installation and commissioning KA5. Quality and standards system followed in the company
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Electrical, electronics and instrumentation KB2. Standard operating procedure (SOP) of the organization for control panel development process KB3. Basics of machine safety and normal safety processes KB4. Quality, standards and guidelines to be followed during panel design development KB5. PLC module and equipments used in the automation process KB6. PLC programming software KB7. General arrangement drawing KB8. Electrical load calculations KB9. Basics on industrial process involved (example: oil and gas, refinery, etc) and stages involved in the process KB10. Safety aspects to be inbuilt in the control panel system as per the process requirement KB11. Instrumentation used in the factory and its wiring concept KB12. PLC Control panel and wiring knowledge KB13. Testing process and parameters involved in the panel testing KB14. Electronics indicators, switchgear and panel accessories KB15. Sources and methods for obtaining required technical information for the control panel being developed KB16. IEC Standards KB17. Relevant regulations, standards and codes of practice and their implications on the panel designing KB18. Procurement of various panel accessories from vendors
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The individual on the job needs to know and understand how to: SA1. Compose E-mails, letters and other official documents clearly SA2. Write user requirements SA3. Prepare fabrication and electrical drawings SA4. Write technical documentation SA5. Write schedules and timelines

	Reading Skills
	The individual on the job needs to know and understand how to: SA6. Read user requirements SA7. Read technical specifications and documentation SA8. Read standards and regulatory compliance documents SA9. Read schedules and timelines SA10. Read drawings
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA11. Question customers appropriately in order to understand the application and the requirements SA12. Discuss task lists, schedules and work-loads with co-workers SA13. Keep customers informed about progress SA14. Use simple and clear language when communicating with a customer SA15. Report issues and problems to managers in clear terms
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Make decisions pertaining to the scope of work SB2. Make decisions pertaining to readiness of the panel for supply SB3. Make decisions pertaining to procurement of panel accessories required for panel making
	Plan and Organise
	The user/individual on the job needs to know and understand: SB4. Plan and organize panel manufacturing - including requirements, design and integration SB5. Anticipate issues and have alternate strategy
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB6. Understand real needs of the customer and suggest most appropriate solution SB7. Support customer when they need help SB8. Build customer relationships and rapport which promotes two way business
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB9. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB10. Solve issues of co-workers lacking the technical background SB11. Identify and implement solutions to resolve delays
	Analytical Thinking

	The user/individual on the job needs to know and understand how to: SB12. Use the existing information to arrive at actionable decision points SB13. Use the existing information for improving the customer satisfaction SB14. Analyze problems and identify causes and possible solutions
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB15. Apply, analyze and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and take action SB16. Anticipate problems, risks and opportunities and utilize these for mitigation and business optimization



NOS Version Control

NOS Code	**IAS/N6000**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Instrumentation Automation Surveillance & Communication**	**Drafted on**	**15/09/2017**
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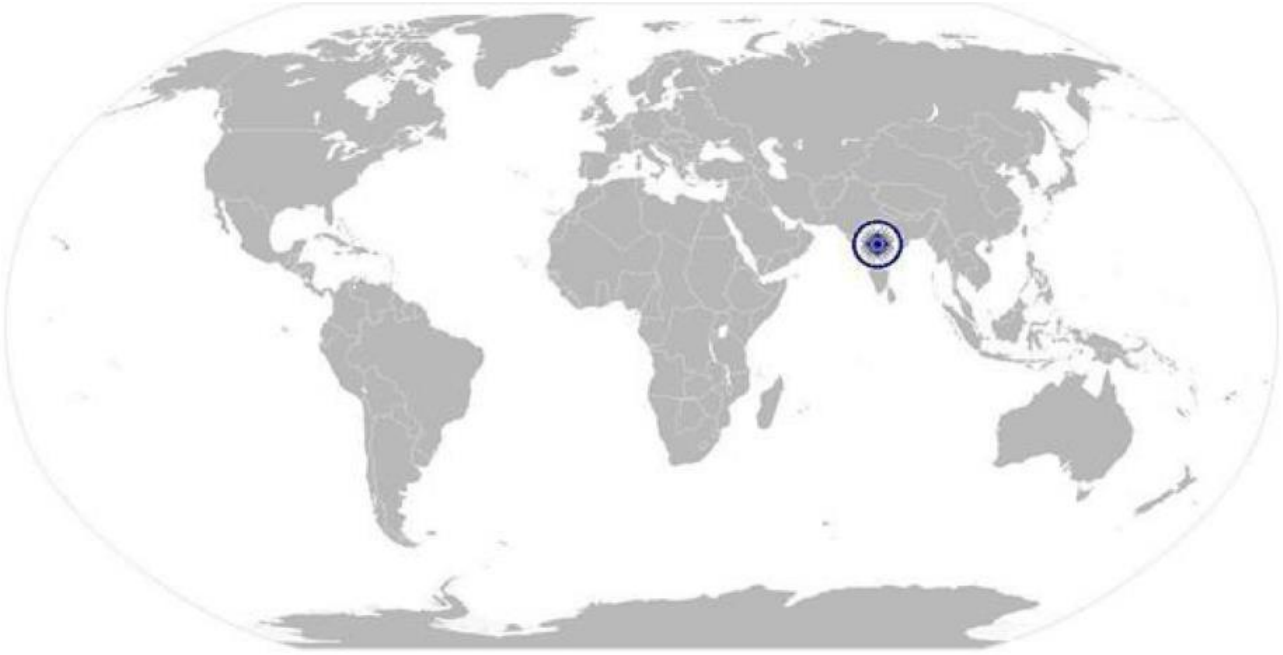
Occupation	**PLC Panel designing, testing and troubleshooting**	**Next review date**	**15/09/2019**



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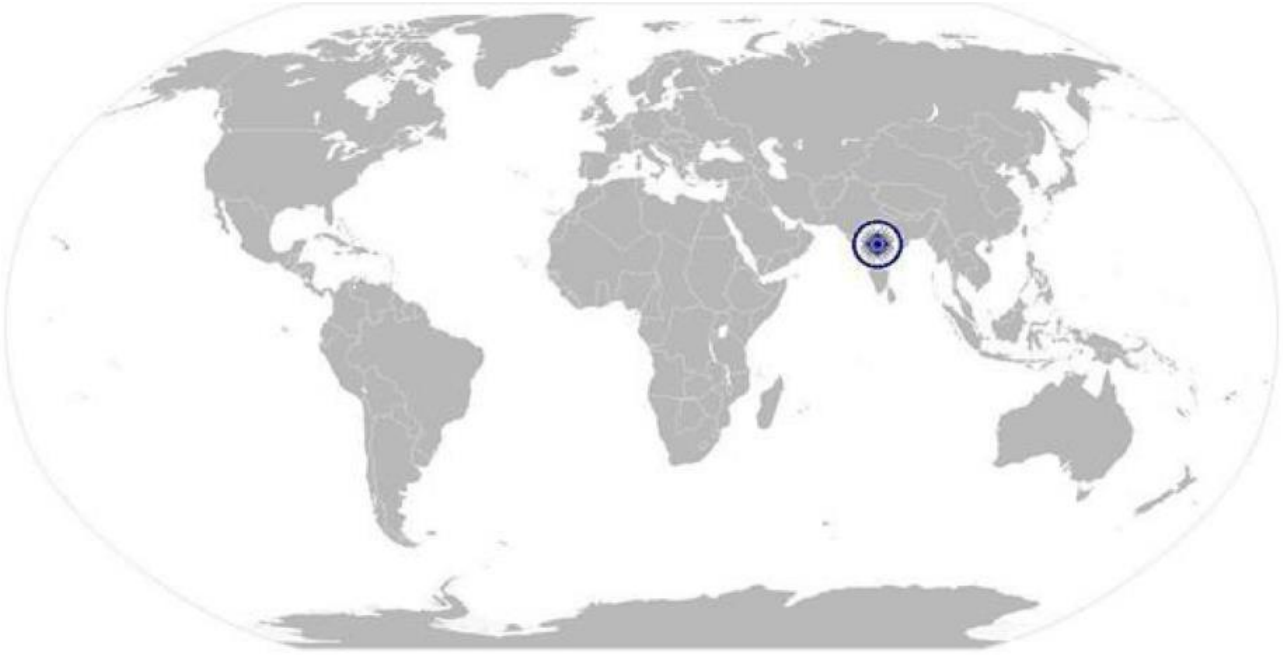

Overview

This unit is about testing the PLC control panel using PLC programming software and HMI hardware.

IAS/N6001 **Testing the PLC Control Panel**

National Occupational Standard

Unit Code	**IAS/N6001**
Unit Title (Task)	**Testing the PLC Control Panel**
Description	This unit is about testing the PLC control panel using PLC programming software and HMI hardware.
Scope	This unit/task covers the following: • Testing panel using PLC programming software • Testing PLC control panel using HMI hardware mounted on the panel • Complete Factory Acceptance Test (FAT)
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Testing panel using PLC programming software	To be competent, the user/individual on the job must be able to PC1. Collect information from project engineer to know Customer approved Software and use it for preliminary testing PC2. Ensure availability of others software's like Office, Adobe reader, Windows features etc. which are required for the PLC programming software. PC3. Identify the operating system of PC/Laptop required for PLC programming software PC4. Ensure availability of the communication port on PC/Laptop and PLC PC5. Establish communication between programming software and PLC using appropriate protocol and cable PC6. Perform basic digital and analog input/output module test using software
Testing PLC control panel using HMI hardware mounted on the panel	PC7. Collect information from project engineer for type of HMI panel to be used PC8. Ensure availability of HMI programming software on PC/Laptop. PC9. Ensure availability of the communication port on PC/Laptop and HMI device PC10. Establish communication between HMI programming software and HMI using appropriate protocol and cable PC11. Prepare screens on HMI with basic objects to monitor and control the inputs and outputs of the plant PC12. Activate inputs and outputs from PLC programming software and monitor the status on HMI screens
Complete Factory Acceptance Test (FAT)	PC13. Prepare a report for panel testing to Project engineer PC14. Invite customer for panel testing at panel manufacturing site PC15. Perform panel testing along with customer and explain him the panel details PC16. After completion of the Factory acceptance test prepare a signed report
Knowledge & Understanding (K)	

A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. Company's code of conduct, organization culture and reporting structure KA2. Company's documentation policy KA3. Company's line of business and production policy KA4. Departments involved with installation and commissioning KA5. Quality and standards system followed in the company
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Electrical, electronics and instrumentation KB2. Basics of computer and operating systems KB3. Standard operating procedure (SOP) of the organization for testing the control panel KB4. Basics of machine safety and normal safety processes KB5. Quality, standards and guidelines to be followed during panel testing KB6. Control system module and technologies used in the automation process KB7. PLC programming software KB8. Safety aspects to be inbuilt in the PLC control panel as per the process requirement KB9. Sources and methods for obtaining required technical information for the testing the panel KB10. IEC Standards in PLC programming language used for testing KB11. Relevant documents to be referred for control panel testing
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The individual on the job needs to know and understand how to: SA1. Compose E-mails, letters and other official documents clearly SA2. Write user requirements SA3. Write test reports SA4. Prepare electrical wiring drawings SA5. Write schedules and timelines
	Reading Skills
	The individual on the job needs to know and understand how to: SA6. Read user requirements SA7. Read technical specifications SA8. Read standards and regulatory compliance documents SA9. Read schedules and timelines SA10. Read drawings
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA11. Question customers appropriately in order to understand the application and the requirements

	SA12. Discuss task lists, schedules, and work-loads with customers SA13. Keep customers informed about progress of logic development SA14. Use simple and clear language when communicating with a customer
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Make decisions pertaining to the scope of work SB2. Make decisions pertaining rediness of control panel for power supply SB3. Make decisions pertaining to use of relevant PLC programming language for testing panel
	Plan and Organise
	The user/individual on the job needs to know and understand: SB4. Plan and organize project - including requirements, design and integration, testing and customer feedback SB5. Anticipate issues and have alternate strategy
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB6. Understand real needs of the customer and suggest most appropriate solution SB7. Make customer happy by fulfilling their requirements SB8. Manage relationships and maintain good rapport with customers to get detail inputs on their requirements
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB9. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB10. Solve issues of co-workers, lacking the technical know how SB11. Identify immediate or temporary solutions to resolve delays
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. Use the existing information to arrive at actionable decision points SB13. Use the existing information for improving the Panel design SB14. Use the existing information to optimize the panel size SB15. Analyze problems and identify causes and possible solutions
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB16. Apply, analyze and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and take action SB17. Anticipate problems, risks and opportunities and utilize these for resolving any issues during testing of panels

NOS Version Control

NOS Code	**IAS/N6001**		
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Industry	**Instrumentation Automation Surveillance & Communication**	**Drafted on**	**15/09/2017**
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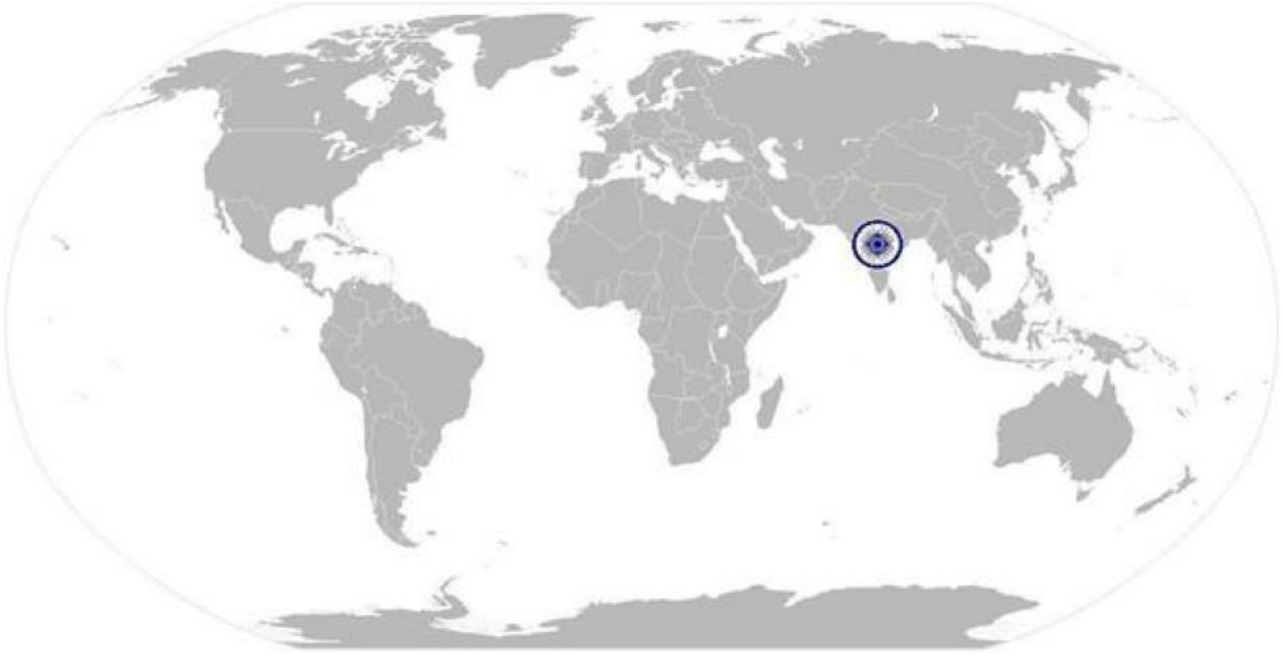

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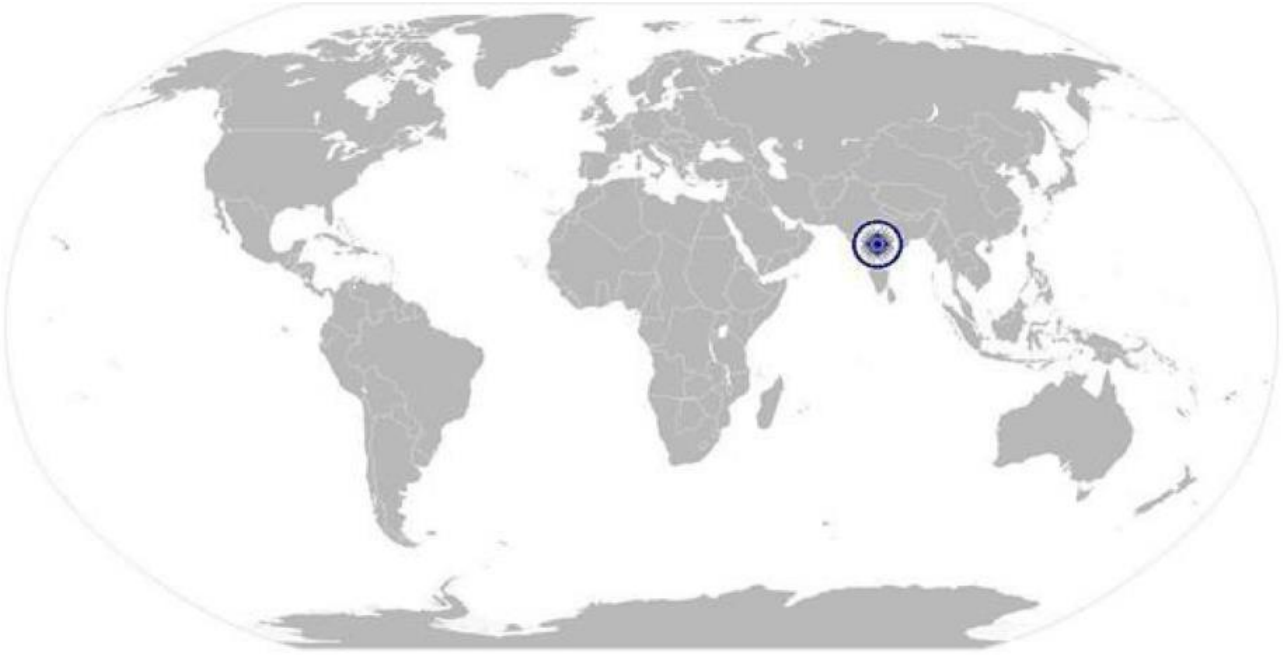

Overview

This unit is about dispatching the control panel and later perform onsite installation and commissioning of the panel.

IAS/N6002 **Dispatch, Installation and Commissioning of control panel**

National Occupational Standard

Unit Code	IAS/N6002
Unit Title (Task)	**Dispatch, Installation and Commissioning of control panel**
Description	This unit is about dispatching the control panel and later perform onsite installation and commissioning of the panel
Scope	This unit/task covers the following: • Dispatch PLC control panel to site • Installation of panel onsite • Panel testing with actual field devices
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Dispatch PLC control panel to site	To be competent, the user/individual on the job must be able to PC1. After FAT ensure that the panel drawings are finalized and panel detail label is fixed on the panel PC2. Assist in packing the panel using bubble wrap or wooden box PC3. Gather detail information from project engineer or customer about the location/address for panel dispatch PC4. Dispatch the panel using a special courier service
Installation of panel onsite	PC5. Place the panel on a proper panel mounting plate PC6. Ensure that there is a cable trench below the panel to allow entry of cables from the cable duct below the panel PC7. Assist and guide onsite wireman to connect field cables to respective terminal base in the panel PC8. Also ensure that the other end of cable is connected to respective field input or output PC9. Perform continuity test between field devices and terminal base before powering the panel
Panel testing with actual field devices	PC10. Connect necessary panel supply to the mains and Power on the panel PC11. Examine whether the field inputs when activated in field gives the status on digital input modules PC12. Activate the field outputs using PLC software or forcing the output modules PC13. Inform project engineer and customer regarding completeness of field wiring and panel testing PC14. Prepare a signed report with the customer for panel commissioning onsite
Knowledge & Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its	The user/individual on the job needs to know and understand: KA1. Company's reporting structure KA2. Company's documentation policy KA3. Company's line of business and product offerings KA4. Company's departments involved with engineering

processes)	KA5. Quality and standards followed in the company
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Electrical, electronics and instrumentation KB2. Basics of computer and operating systems KB3. Standard operating procedure (SOP) of the organization for control panel installation and commissioning KB4. Module and equipments used in the automation process KB5. Application software, Installation, commissioning and testing KB6. General arrangement drawing KB7. Piping and instrumentation diagram (P&ID) KB8. Basics on industrial process involved (example: oil and gas, refinery, etc) and stages involved in the process KB9. Basics on infrastructure process involved in the industry (example: water treatment plant, chilling units etc.) KB10. Safety aspects to be inbuilt in the Panel as per the process requirement KB11. Sources and methods for obtaining required technical information for the panel installation and commissioning KB12. IEC Standards in panel installation onsite
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The individual on the job needs to know and understand how to: SA1. Compose E-mails, letters and other official documents clearly SA2. Write technical documentation SA3. Write installation and commissioning reports SA4. Write schedules and timelines
	Reading Skills
	The individual on the job needs to know and understand how to: SA5. Read user requirements SA6. Read technical specifications SA7. Read standards and regulatory compliance documents SA8. Read schedules and timelines SA9. Read drawings
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA10. Discuss task lists, schedules and work-loads with colleagues SA11. Keep colleagues informed about progress of panel installation and testing SA12. Discuss with colleagues appropriately in order to understand the nature of the problem and make a diagnosis SA13. Report issues and problems to managers in clear terms

IAS/N6002 **Dispatch, Installation and Commissioning of control panel**

B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Make decisions pertaining to the scope of work SB2. Make decisions pertaining to use appropriate vendor for panel packing and dispatching SB3. Make decisions pertaining to readiness of site for panel installation SB4. Make decisions pertaining to commissioning of panel onsite
	Plan and Organise
	The user/individual on the job needs to know and understand: SB5. Plan and organize project - including requirements, design and integration, testing, installation and commissioning, Customer Acceptance Test and customer feedback SB6. Anticipate issues and have alternate strategy
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB7. Understand real needs of the customer and deliver most appropriate solution SB8. Build good relationships and rapport with customers which will help in inputs related to panel testing with actual field devices
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB9. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB10. Solve problems of colleagues lacking the technical background SB11. Identify immediate or temporary solutions to resolve faults and implement the proper solution immediately
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. Use the existing information to arrive at actionable decision points SB13. Use the existing information to complete the job in time SB14. Analyze problems and identify causes and possible solutions
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB15. Apply, analyze and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and take action SB16. Anticipate problems, risks and opportunities and utilize these for solving issues in panel installation and commissining

NOS Version Control

NOS Code	**IAS/N6002**		
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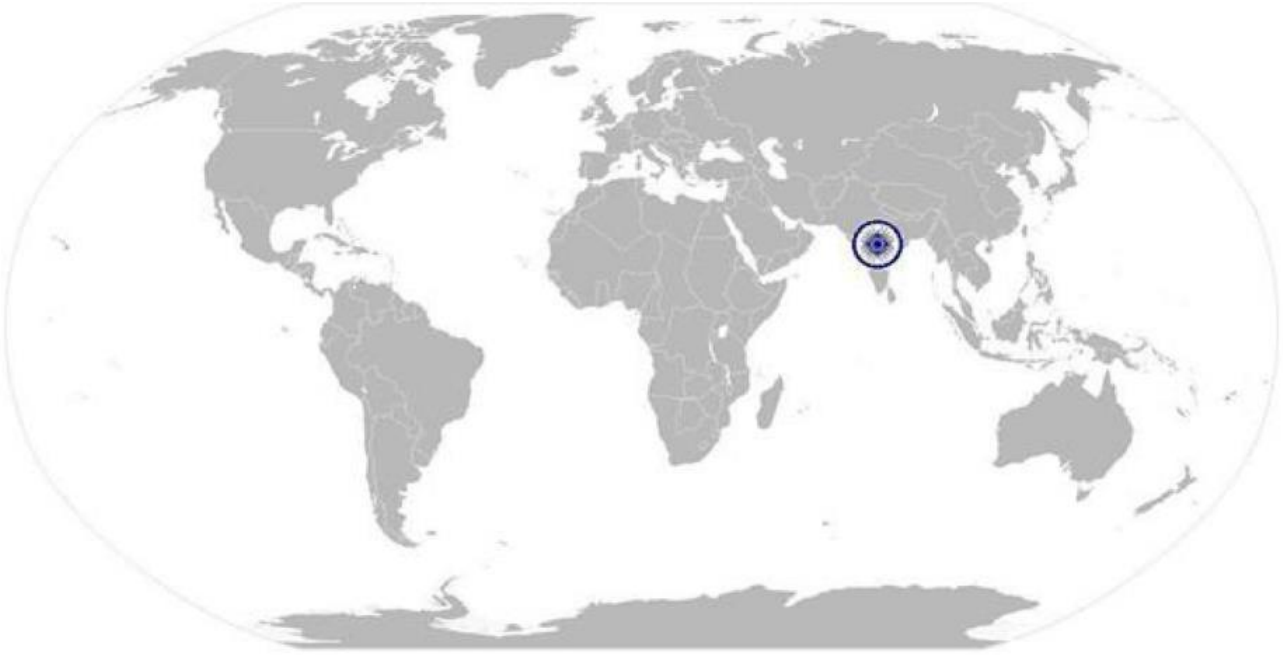
Industry	**Instrumentation Automation Surveillance & Communication**	**Drafted on**	**15/09/2017**
Industry Sub-sector	**Automation**	**Last reviewed on**	**15/09/2017**
Occupation	**PLC Panel designing, testing and troubleshooting**	**Next review date**	**15/09/2019**



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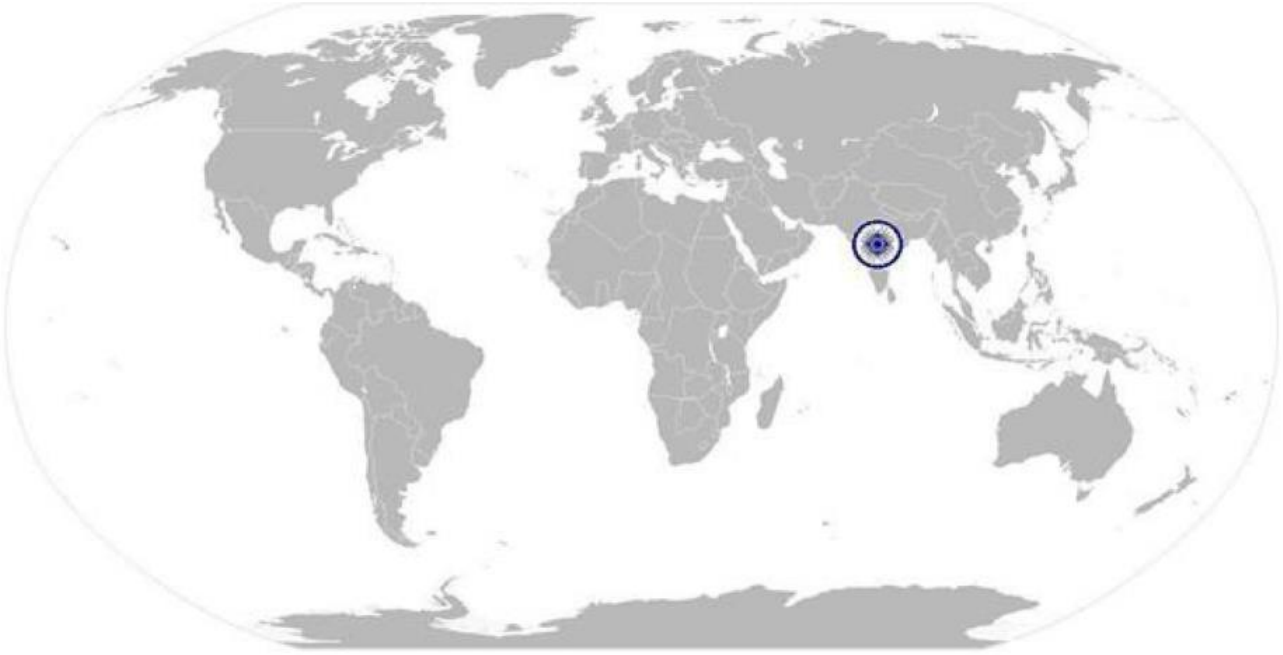


Overview

This unit is about the individual's responsibility to maintain a safe, healthy and secure working environment.

National Occupational Standard

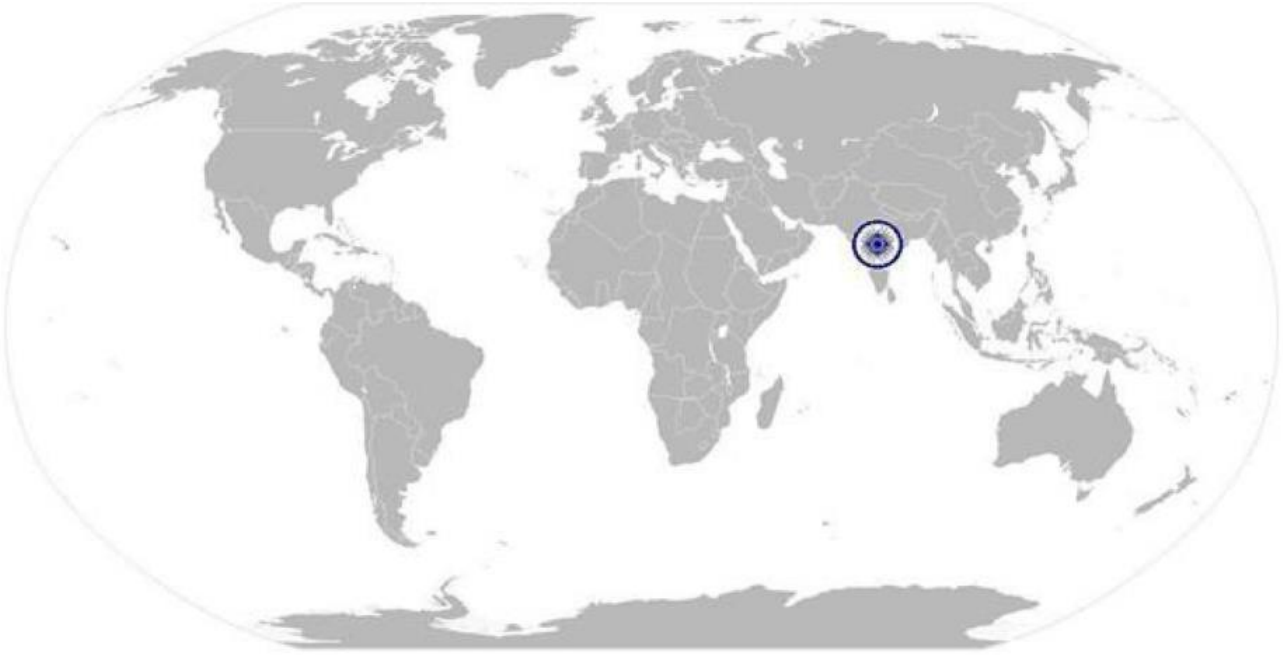
Unit Code	IAS/N2005
Unit Title (Task)	**Health and Safety in Workplace**
Description	This unit is about following adequate safety procedures to make work environment safe and healthy.
Scope	This unit/task covers the following: • Following safety measures and standards • Maintaining good health and posture
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Following safety measures and standards	To be competent, the individual must be able to: PC1. Comply with general and special safety procedures followed in the Company PC2. Follow specified safety procedures while handling an equipment, hazardous material or tool PC3. Remove ties, finger rings, or any other metal objects which may interfere with the work PC4. Use safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc. PC5. Escalate about any hazardous materials or things found in the premises PC6. Report about any breach of safety procedure in the company PC7. Ensure zero accidents at work PC8. Avoid damage of components due to negligence in ESD procedures PC9. Regularly participate in fire drills or other safety related workshops organized by the company PC10. Ensure no loss for company due to safety negligence
Maintaining good health and posture	PC11. Maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials PC12. Participate in company organized health sessions such as yoga, physiotherapy or games PC13. Handle heavy and hazardous materials with care and using appropriate tools and handling equipment such as trolleys, jacks and ladders
Knowledge & Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The individual on the job needs to know and understand: KA1. Company's policies on: incentives, delivery standards, and personnel management KA2. Company occupational safety and health policies KA3. Company emergency evacuation procedure KA4. Company's medical policy

B. Technical Knowledge	The individual on the job needs to know and understand: KB1. How to maintain the work area safe and secure KB2. How to handle hazardous materials, tools and equipment KB3. Emergency procedures to be followed such as fire accidents, electrocution etc. KB4. Long term value of good posture and use of appropriate handling equipment KB5. Safety regulations and standards and how to apply these KB6. Electrical grounding practices
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The individual on the job needs to know and understand: SA1. Compose E-mails, letters, memos, reminders, and other documents clearly SA2. Share knowledge, issues, problems and resolutions relating to safety and health
	Reading Skills
	The individual on the job needs to know and understand: SA3. Read mails, messages, alerts SA4. Read pictures, drawings, notes relating to safety and health
	Oral Communication (Listening and Speaking skills)
	The individual on the job needs to know and understand: SA5. Question co-workers in order to understand the safety and health issues SA6. Inform co-workers about safety and health issues SA7. Report issues and problems relating to safety and health to managers in clear terms
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Make decisions pertaining to safety and health issues at workplace SB2. Make decisions about escalating safety and health issues at workplace to managers
	Plan and Organise
	The user/individual on the job needs to know and understand: SB3. Plan and organize work conforming to the safety and health norms of the company
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. Discuss customer needs with co-workers and identify most appropriate solution make customer happy and make them want

	to work with the company
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB5. Discuss problems relating to the safety and health, evaluate the possible solution(s) and arrive at optimum /best possible solution(s)in consultation with concerned people
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB6. Discuss use the available information with co-workers to arrive at actionable decision points SB7. Analyze problems in team and identify causes and possible solutions
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB8. Collaborate with co-workers to analyze, and evaluate the information gathered from collective observation, experience, reasoning, or communication, as a guide to teamwork

NOS Version Control

NOS Code	**IAS/N2005**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Instrumentation Automation Surveillance & Communication**	**Drafted on**	**15/09/2017**
Industry Sub-sector	**Automation**	**Last reviewed on**	**15/09/2017**
Occupation	**PLC Panel designing, testing and troubleshooting**	**Next review date**	**15/09/2019**



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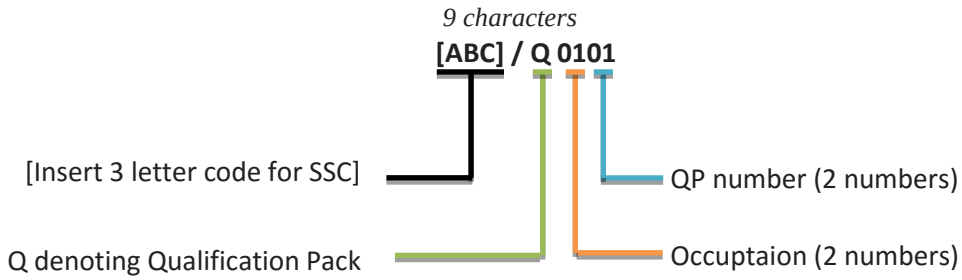
Annexure

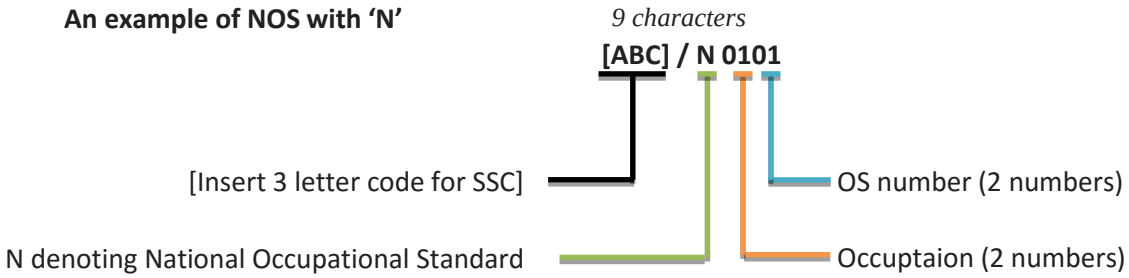
Nomenclature for QP and NOS

Qualification Pack



Occupational Standard

An example of NOS with 'N'



The following acronyms/codes have been used in the nomenclature above:

Sub-sector	Range of Occupation numbers
Installation & Commissioning	00-29
Operation & Maintenance	30-49
Calibration	50-55
Design, Fabrication / Manufacturing	56-79
Design, Fabrication, Installation & commissioning	80-89
General	90-99

Sequence	Description	Example
Three letters	Industry name	[ABC, Font: Calibri (Body), size 11]
Slash	/	/
Next letter	Whether **Q**P or **N**OS	N
Next two numbers	Occupation code	01
Next two numbers	OS number	01

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CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role PLC Technician

Qualification Pack IAS/Q5601

Sector Skill Council Instrumentation Automation Surveillance & Communication

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
4. Individual assessment agencies will create unique evaulations for skill practical for every student at each examination/training center based on this criteria.
5. To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS. 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.

		Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	**Total Mark (410)**	**Out Of**	**Theory**	**Skills Practical**
1.IAS/N6000 Detailing and procurement of equipment used in PLC Control Panel	PC1. Identify the customer requirement of the PLC Control Panel	**150**	10	10	0
	PC2. Understand and examine the onsite location where Control Panel will be placed		10	5	5
	PC3. Interact with Project engineer or customer & understand number of field equipments helping to analyze the size of control panel		10	10	0
	PC4. Prepare the dimension of control panel with the help of fabricator		10	5	5
	PC5. Interact with project engineer or customer for Panel HMI mounting & Panel switches and then guiding fabrication team for the cutouts on panel door		10	10	0
	PC6. Assisting in mounting of components on the mounting plate inside the control panel		10	5	5
	PC7. Prepare panel fabrication drawing and internal mounting layout drawings with dimensions		10	5	5
	PC8. Interact with Project engineer to collect the material list regarding PLC modules		5	5	0
	PC9. Procure PLC modules and accessories required for mounting in panel		10	10	0

	PC10. Procure panel accessories like wires, ferrules, sleeves, terminal base, fans, tube light etc.		5	5	0
	PC11. Procure switchgear accessories like push buttons, switches, contactors and relays		5	5	0
	PC12. Prepare Input Output list and get it approved from Project engineer or customer		10	0	10
	PC13. Assist draftsman to prepare engineering drawing for the panels and wiring diagrams for field connections		10	5	5
	PC14. Examine the drawings and get it approved from the Project engineer		5	0	5
	PC15. Assist and guide wireman for panel wiring		10	5	5
	PC16. Examine panel wiring using continuity test		5	0	5
	PC17. Examine the Mains power supply unit for powering the PLC Control panel		5	0	5
	PC18. Examine the wiring of the Digital and Analog IO modules with other components inside the panel		5	0	5
	PC19. Examine special modules if used in panel for advance communications		5	0	5
		Total	150	85	65
2.IAS/N6001 Testing the PLC Control Panel	PC1. Collect information from project engineer to know Customer approved Software and use it for preliminary testing	**110**	10	5	5
	PC2. Ensure availability of others software's like Office, Adobe reader, Windows features etc. which are required for the PLC programming software.		5	5	0
	PC3. Identify the operating system of PC/Laptop required for PLC programming software		10	10	0
	PC4. Ensure availability of the communication port on PC/Laptop and PLC		5	5	0
	PC5. Establish communication between programming software and PLC using appropriate protocol and cable		5	0	5
	PC6. Perform basic digital and analog input/output module test using software		10	0	10
	PC7. Collect information from project engineer for type of HMI panel to be used		5	5	0
	PC8. Ensure availability of HMI programming software on PC/Laptop.		5	5	0
	PC9. Ensure availability of the communication port on PC/Laptop and HMI device		5	5	0

	PC10. Establish communication between HMI programming software and HMI using appropriate protocol and cable		5	0	5
	PC11. Prepare screens on HMI with basic objects to monitor and control the inputs and outputs of the plant		10	0	10
	PC12. Activate inputs and outputs from PLC programming software and monitor the status on HMI screens		10	0	10
	PC13. Prepare a report for panel testing to Project engineer		5	0	5
	PC14. Invite customer for panel testing at panel manufacturing site		5	5	0
	PC15. Perform panel testing along with customer and explain him the panel details		10	5	5
	PC16. After completion of the Factory acceptance test prepare a signed report		5	0	5
		Total	110	50	60
3. IAS/N6002 Dispatch, Installation and Commissioning of control panel	PC1. After FAT ensure that the panel drawings are finalized and panel detail label is fixed on the panel	**80**	10	5	5
	PC2. Assist in packing the panel using bubble wrap or wooden box		5	5	0
	PC3. Gather detail information from project engineer or customer about the location/address for panel dispatch		5	5	0
	PC4. Dispatch the panel using a special courier service		5	5	0
	PC5. Place the panel on a proper panel mounting plate		5	0	5
	PC6. Ensure that there is a cable trench below the panel to allow entry of cables from the cable duct below the panel		5	5	0
	PC7. Assist and guide onsite wireman to connect field cables to respective terminal base in the panel		5	0	5
	PC8. Also ensure that the other end of cable is connected to respective field input or output		5	0	5
	PC9. Perform continuity test between field devices and terminal base before powering the panel		5	0	5
	PC10. Connect necessary panel supply to the mains and Power on the panel		5	0	5
	PC11. Examine whether the field inputs when activated in field gives the status on digital input modules		10	0	10
	PC12. Activate the field outputs using PLC software or forcing the output modules		5	0	5

	PC13. Inform project engineer and customer regarding completeness of field wiring and panel testing		5	5	0
	PC14. Prepare a signed report with the customer for panel commissioning onsite		5	5	0
		Total	80	35	45
4. IAS/N2005 Health and Safety in Workplace	PC1. Comply with general and special safety procedures followed in the Company	**70**	10	10	0
	PC2. Follow specified safety procedures while handling an equipment, hazardous material or tool		5	0	5
	PC3. Remove ties, finger rings, or any other metal objects which may interfere with the work		5	0	5
	PC4. Use safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.		5	5	5
	PC5. Escalate about any hazardous materials or things found in the premises		5	5	0
	PC6. Report about any breach of safety procedure in the company		5	5	0
	PC7. Ensure zero accidents at work		5	5	0
	PC8. Avoid damage of components due to negligence in ESD procedures		5	0	5
	PC9. Regularly participate in fire drills or other safety related workshops organized by the company		5	0	5
	PC10. Ensure no loss for company due to safety negligence		5	5	0
	PC11. Maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials		5	0	5
	PC12. Participate in company organized health sessions such as yoga, physiotherapy or games		5	0	5
	PC13. Handle heavy and hazardous materials with care and using appropriate tools and handling equipment such as trolleys, jacks and ladders		5	0	5
		Total	70	30	40

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