

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

### 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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### Contents

1. Introduction and Contacts..... [P01](#)
2. Qualification Pack..... [P02](#)
3. Glossary of Key Terms..... [P03](#)
4. OS Units..... [P04](#)
5. Nomenclature for QP & OS..... [P05](#)
6. Assessment Criteria..... [P06](#)

## Introduction

### Qualification Pack-VFD Technician

**SECTOR:** INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION

**SUB-SECTOR:** Automation

**OCCUPATION:** VFD Panel designing, testing and troubleshooting

**REFERENCE ID:** IAS/Q5604

**ALIGNED TO:** NCO-2015/ NIL

**VFD Technician** analyses the customers requirements regarding the VFD 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 equipments by basic programming of VFD and troubleshooting any faults in the control panels.

**Personal Attributes:** The individual must have knowledge of process industry, electrical equipments 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	<b>Qualification Pack Code</b>	<b>IAS/Q5604</b>		
	<b>Job Role</b>	<b>VFD Technician</b>		
	<b>Credits (NSQF)</b>	<b>TBD</b>	<b>Version number</b>	<b>1.0</b>
	<b>Sector</b>	<b>Instrumentation Automation Surveillance &amp; Communication</b>	<b>Drafted on</b>	<b>15/09/2017</b>
	<b>Sub-sector</b>	<b>Automation</b>	<b>Last reviewed on</b>	<b>15/09/2017</b>
	<b>Occupation</b>	<b>VFD Panel designing, testing and troubleshooting</b>	<b>Next review date</b>	<b>15/09/2019</b>
	<b>NSQC Clearance on*</b>	<b>DD/MM/YYYY</b>		

\* only after clearance from NSQC

<b>Job Role</b>	<b>VFD Technician</b>
<b>Role Description</b>	a. Designing of VFD control panel b. Fabrication of panels c. Testing & Troubleshooting panels d. Installation of control panels onsite
<b>NSQF level</b>	3
<b>Minimum Educational Qualifications</b>	12 <sup>th</sup> Pass, Preferably ITI – Electrical or Electronics
<b>Maximum Educational Qualifications</b>	NA
<b>Training</b> (Suggested but not mandatory)	Training on Basics motors and drives.
<b>Minimum Job Entry Age</b>	20 years.
<b>Experience</b>	Experience of minimum six months in Panel designing, Fabrication and wiring of the components in a control panel
<b>Applicable National Occupational Standards (NOS)</b>	<b>Compulsory:</b> <ol style="list-style-type: none"> <li><a href="#">IAS/N6300 Detailing and procurement of equipment used in VFD Control Panel</a></li> <li><a href="#">IAS/N6301 Testing the VFD Control Panel</a></li> <li><a href="#">IAS/N6302 Dispatch, Installation and Commissioning of control panel</a></li> <li><a href="#">IAS/N2005 Health and Safety in Workplace</a></li> </ol> <b>Optional:</b> N.A.
<b>Performance Criteria</b>	As described in the relevant OS units

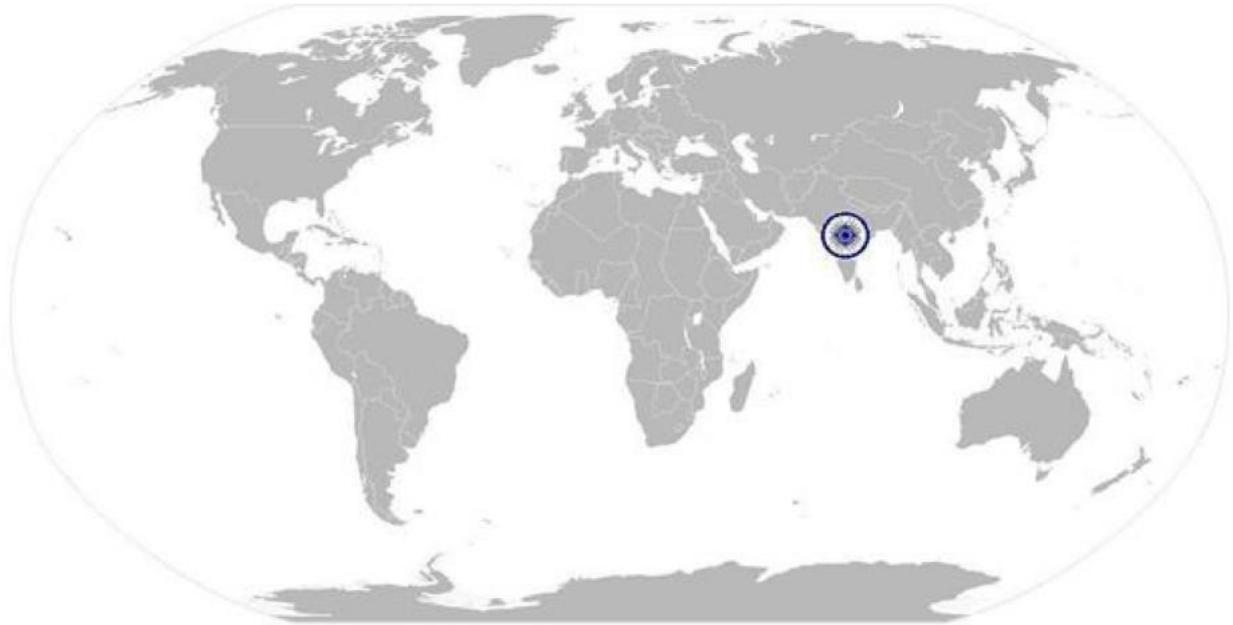
Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further 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 code is 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	Knowledge and understanding are statements 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.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

**Acronyms**

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.
Keywords /Terms	Description
FAT	Factory Acceptance Test
PLC	Programmable Logic Controller
VFD	Variable Frequency Drive
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

[Back on top...](#)

# National Occupational Standard



## Overview

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

IAS/N6300

**Detailing and procurement of equipment used in VFD Control Panel**

National Occupational Standard

<b>Unit Code</b>	<b>IAS/N6300</b>
<b>Unit Title (Task)</b>	<b>Detailing and procurement of equipment used in VFD Control Panel</b>
<b>Description</b>	This unit is about gathering the detail information about the VFD control panel and later procuring the material for the control panel.
<b>Scope</b>	This unit/task covers the following: <ul style="list-style-type: none"> <li>• Detailing the VFD Control Panel functional requirements</li> <li>• Procurement of accessories used in the Control Panel</li> <li>• Examine the Control Panel</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Detailing the VFD Control Panel functional requirements</b>	<p>To be competent, the user/individual on the job must be able to</p> <p>PC1. Identify the customer requirement of the VFD Control Panel</p> <p>PC2. Understand and examine the onsite location where Control Panel will be placed</p> <p>PC3. Interact with Project engineer or customer and understand the application of the VFD and accordingly consider the size of control panel</p> <p>PC4. Prepare the dimension of control panel with the help of fabricator</p> <p>PC5. Interact with project engineer or customer for considering Operating Panel &amp; switches and then guiding fabrication team for the cutouts on panel door</p> <p>PC6. Assisting in mounting of components on the mounting plate inside the control panel</p> <p>PC7. Prepare panel fabrication drawing and internal mounting layout drawings</p> <p>PC8. Select VFD based on motor HP(Horse Power) and type of motor</p>
<b>Procurement of accessories used in the Control Panel</b>	<p>PC9. Interact with Project engineer to collect the material list regarding type of VFD</p> <p>PC10. Procure VFD modules and accessories required for mounting in panel</p> <p>PC11. Procure panel accessories like wires, ferrules, sleeves, terminal base, fans, tube light etc.</p> <p>PC12. Procure switchgear accessories like push buttons, switches, contactors and relays</p> <p>PC13. Prepare Input Output list of VFD for communication with the PLC inputs and outputs and get it approved from Project engineer or customer</p> <p>PC14. Assist draftsman to prepare engineering drawing for the panels and wiring diagrams for field connections</p> <p>PC15. Examine the drawings and get it approved from the Project engineer</p> <p>PC16. Assist and guide wireman for panel wiring</p>

IAS/N6300

**Detailing and procurement of equipment used in VFD Control Panel**

<p><b>Examine the Control Panel</b></p>	<p>PC17. Examine panel wiring using continuity test            PC18. Examine the Mains power supply unit for powering the VFD Control panel            PC19. Examine the wiring of the Digital and Analog terminals of VFD with other components inside the panel and with PLC input-output signals            PC20. Examine special modules if used in panel for advance communications</p>
<p><b>Knowledge &amp; Understanding (K)</b></p>	
<p><b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)</p>	<p>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</p>
<p><b>B. Technical Knowledge</b></p>	<p>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. VFD Components and equipments used in the automation process            KB6. VFD programming software            KB7. Select the operating system of PC/Laptop suitable for VFD Programming software            KB8. General arrangement drawing            KB9. Electrical load calculations            KB10. Basics on industrial process involved (example: oil and gas, refinery, etc) and stages involved in the process            KB11. Safety aspects to be inbuilt in the control panel system as per the process requirement            KB12. Instrumentation used in the factory and its wiring concept            KB13. VFD Control panel and wiring knowledge            KB14. Testing process and parameters involved in the panel testing            KB15. Electronics indicators, switchgear and panel accessories            KB16. Sources and methods for obtaining required technical information for the control panel being developed            KB17. IEC Standards            KB18. Relevant regulations, standards and codes of practice and their implications on the panel designing            KB19. Procurement of various panel accessories from vendors</p>
<p><b>Skills (S)</b></p>	

**IAS/N6300**

**Detailing and procurement of equipment used in VFD Control Panel**

<b>A. Core Skills/ Generic Skills</b>	<b>Writing Skills</b>
	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
	<b>Reading Skills</b>
	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
	<b>Oral Communication (Listening and Speaking skills)</b>
	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>B. Professional Skills</b>	<b>Decision Making</b>
	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
	<b>Plan and Organise</b>
	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
	<b>Customer Centricity</b>
	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



IAS/N6300

**Detailing and procurement of equipment used in VFD Control Panel**

	<b>Problem Solving</b>
	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
	<b>Analytical Thinking</b>
	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
	<b>Critical Thinking</b>
	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

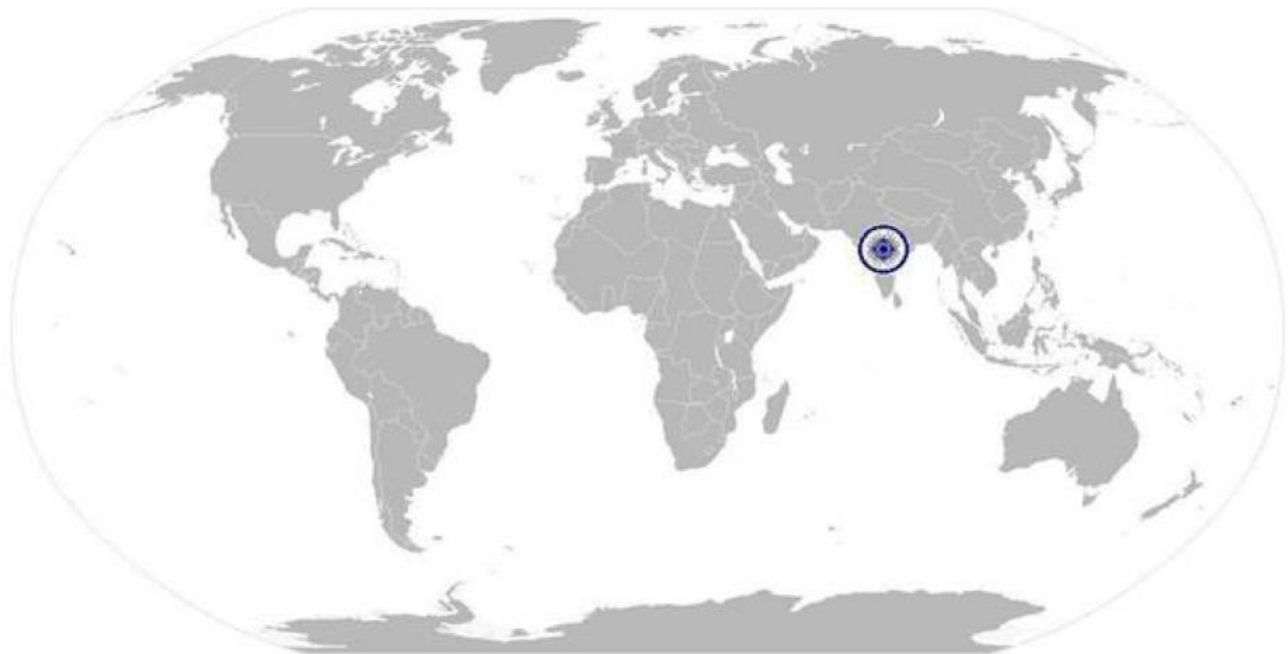


IAS/N6300

Detailing and procurement of equipment used in VFD Control Panel

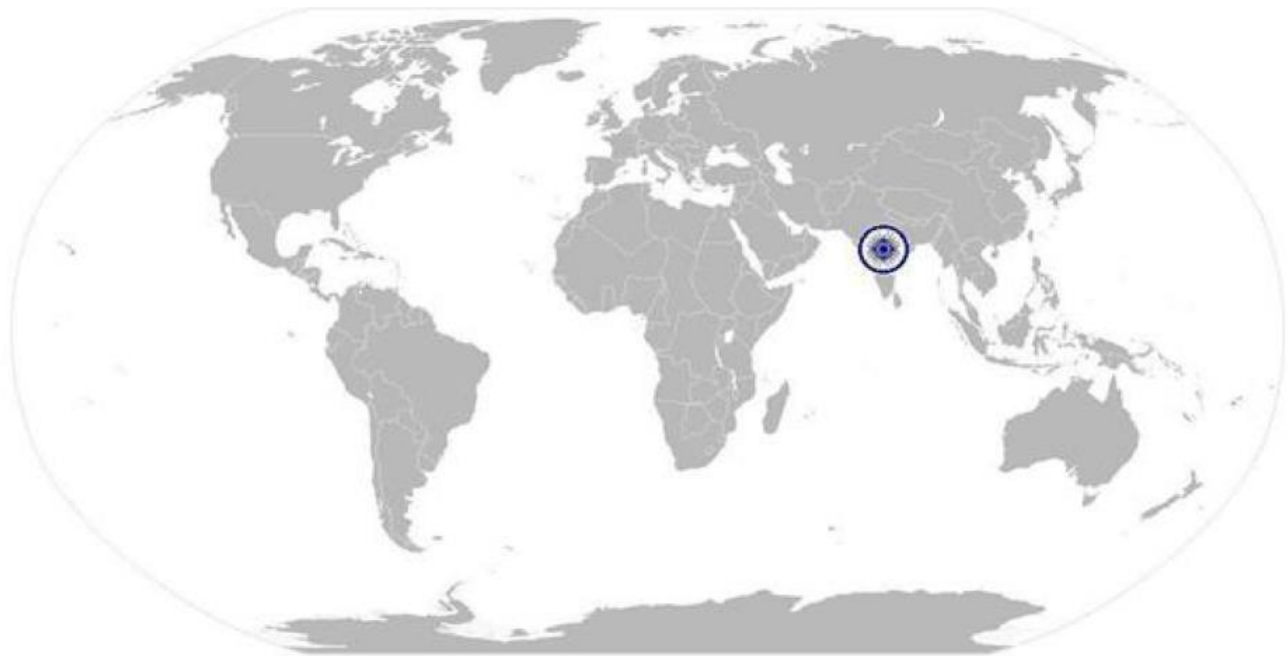
**NOS Version Control**

<b>NOS Code</b>	IAS/N6300		
<b>Credits (NSQF)</b>	TBD	<b>Version number</b>	1.0
<b>Industry</b>	Instrumentation Automation Surveillance & Communication	<b>Drafted on</b>	15/09/2017
<b>Industry Sub-sector</b>	Automation	<b>Last reviewed on</b>	15/09/2017
<b>Occupation</b>	VFD Panel designing, testing and troubleshooting	<b>Next review date</b>	15/09/2019



[Back on top...](#)

# National Occupational Standard



## Overview

This unit is about testing the VFD control panel using VFD programming software.

**IAS/N6301**

**Testing the VFD Control Panel**

National Occupational Standard

<b>Unit Code</b>	<b>IAS/N6301</b>
<b>Unit Title (Task)</b>	<b>Testing the VFD Control Panel</b>
<b>Description</b>	This unit is about testing the VFD control panel using VFD programming software and hardware.
<b>Scope</b>	This unit/task covers the following: <ul style="list-style-type: none"> <li>• Testing panel using VFD programming software</li> <li>• Testing VFD control panel using Operating Panel of VFD</li> <li>• Complete Factory Acceptance Test (FAT)</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Testing panel using VFD programming software</b>	To be competent, the user/individual on the job must be able to <ul style="list-style-type: none"> <li>PC1. Collect information from project engineer to know Customer approved Software and use it for preliminary testing</li> <li>PC2. Ensure availability of others software's like Office, Adobe reader, Windows features etc. which are required for the VFD programming software.</li> <li>PC3. Ensure availability of the communication port on PC/Laptop and VFD</li> <li>PC4. Establish communication between programming software and VFD using appropriate protocol and cable</li> <li>PC5. Perform basic digital and analog input/output test using hardware components and VFD software command</li> </ul>
<b>Testing VFD control panel using Operating Panel of VFD</b>	<ul style="list-style-type: none"> <li>PC6. Collect information from project engineer for type of Operating panel of VFD to be used</li> <li>PC7. Parameterize the VFD from Operating Panel and control the operation of motor in the plant</li> <li>PC8. Test operations of the motor from VFD programming software and monitor the status parameters on Operating panel of VFD</li> </ul>
<b>Complete Factory Acceptance Test (FAT)</b>	<ul style="list-style-type: none"> <li>PC9. Prepare a report for panel testing and submit to Project engineer</li> <li>PC10. Invite customer for panel testing at panel manufacturing site</li> <li>PC11. Perform panel testing along with customer and explain him the panel details</li> <li>PC12. After completion of the Factory acceptance test prepare a signed report</li> </ul>
<b>Knowledge &amp; Understanding (K)</b>	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: <ul style="list-style-type: none"> <li>KA1. Company's code of conduct, organization culture and reporting structure</li> <li>KA2. Company's documentation policy</li> <li>KA3. Company's line of business and production policy</li> <li>KA4. Departments involved with installation and commissioning</li> <li>KA5. Quality and standards system followed in the company</li> </ul>

IAS/N6301

**Testing the VFD Control Panel**

<p><b>B. Technical Knowledge</b></p>	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>KB1. Electrical, electronics and instrumentation</li> <li>KB2. Basics of computer and operating systems</li> <li>KB3. Standard operating procedure (SOP) of the organization for testing the control panel</li> <li>KB4. Basics of machine safety and normal safety processes</li> <li>KB5. Quality, standards and guidelines to be followed during panel testing</li> <li>KB6. Control system module and technologies used in the automation process</li> <li>KB7. VFD programming software</li> <li>KB8. Safety aspects to be inbuilt in the VFD control panel as per the process requirement</li> <li>KB9. Sources and methods for obtaining required technical information for the testing the panel</li> <li>KB10. IEC Standards in VFD programming used for testing</li> <li>KB11. Relevant documents to be referred for control panel testing</li> </ul>
<p><b>Skills (S)</b></p>	
<p><b>A. Core Skills/ Generic Skills</b></p>	<p><b>Writing Skills</b></p> <p>The individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA1. Compose E-mails, letters and other official documents clearly</li> <li>SA2. Write user requirements</li> <li>SA3. Write test reports</li> <li>SA4. Prepare electrical wiring drawings</li> <li>SA5. Write schedules and timelines</li> </ul> <p><b>Reading Skills</b></p> <p>The individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA6. Read user requirements</li> <li>SA7. Read technical specifications</li> <li>SA8. Read standards and regulatory compliance documents</li> <li>SA9. Read schedules and timelines</li> <li>SA10. Read drawings</li> </ul> <p><b>Oral Communication (Listening and Speaking skills)</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA11. Question customers appropriately in order to understand the application and the requirements</li> <li>SA12. Discuss task lists, schedules, and work-loads with customers</li> <li>SA13. Keep customers informed about progress of logic development</li> <li>SA14. Use simple and clear language when communicating with a customer</li> </ul>
<p><b>B. Professional Skills</b></p>	<p><b>Decision Making</b></p>

**IAS/N6301**

**Testing the VFD Control Panel**

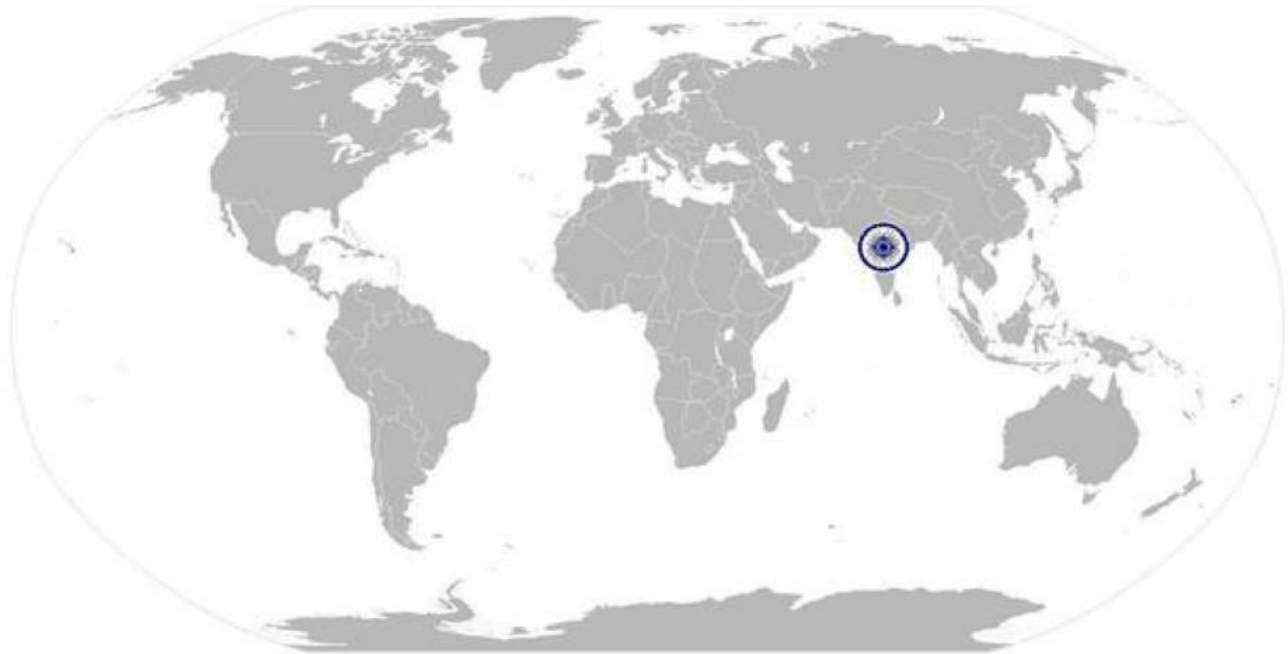
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB1. Make decisions pertaining to the scope of work</li> <li>SB2. Make decisions pertaining rediness of control panel for power supply</li> <li>SB3. Make decisions pertaining to use of relevant VFD programming software for testing panel</li> </ul>
	<p><b>Plan and Organise</b></p>
	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>SB4. Plan and organize project - including requirements, design and integration, testing and customer feedback</li> <li>SB5. Anticipate issues and have alternate strategy</li> </ul>
	<p><b>Customer Centricity</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB6. Understand real needs of the customer and suggest most appropriate solution</li> <li>SB7. Make customer happy by fulfilling their requirements</li> <li>SB8. Manage relationships and maintain good rapport with customers to get detail inputs on their requirements</li> </ul>
	<p><b>Problem Solving</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB9. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)</li> <li>SB10. Solve issues of co-workers, lacking the technical know how</li> <li>SB11. Identify immediate or temporary solutions to resolve delays</li> </ul>
	<p><b>Analytical Thinking</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB12. Use the existing information to arrive at actionable decision points</li> <li>SB13. Use the existing information for improving the Panel design</li> <li>SB14. Use the existing information to optimize the panel size</li> <li>SB15. Analyze problems and identify causes and possible solutions</li> </ul>
	<p><b>Critical Thinking</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB16. Apply, analyze and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and take action</li> <li>SB17. Anticipate problems, risks and opportunities and utilize these for resolving any issues during testing of panels</li> </ul>

IAS/N6301

Testing the VFD Control Panel

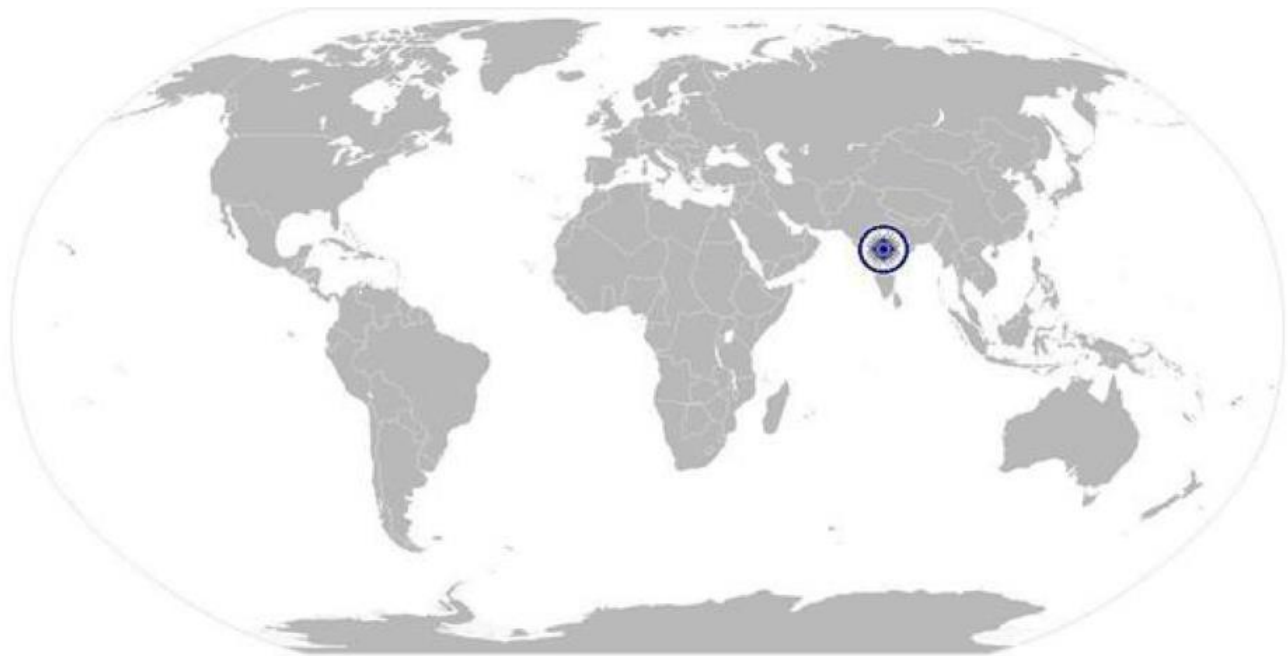
**NOS Version Control**

<b>NOS Code</b>	IAS/N6301		
<b>Credits (NSQF)</b>	TBD	<b>Version number</b>	1.0
<b>Industry</b>	Instrumentation Automation Surveillance & Communication	<b>Drafted on</b>	15/09/2017
<b>Industry Sub-sector</b>	Automation	<b>Last reviewed on</b>	15/09/2017
<b>Occupation</b>	VFD Panel designing, testing and troubleshooting	<b>Next review date</b>	15/09/2019



[Back on top...](#)

# National Occupational Standard



## Overview

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



IAS/N6302

**Dispatch, Installation and Commissioning of control panel**

National Occupational Standard

<b>Unit Code</b>	<b>IAS/N6302</b>
<b>Unit Title (Task)</b>	<b>Dispatch, Installation and Commissioning of control panel</b>
<b>Description</b>	This unit is about dispatching the control panel and later perform onsite installation and commissioning of the panel
<b>Scope</b>	This unit/task covers the following: <ul style="list-style-type: none"> <li>• Dispatch VFD control panel to site</li> <li>• Installation of panel onsite</li> <li>• Panel testing with actual field devices</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Dispatch VFD control panel to site</b>	To be competent, the user/individual on the job must be able to <ul style="list-style-type: none"> <li>PC1. After FAT ensure that the panel drawings are finalized and panel detail label is fixed on the panel</li> <li>PC2. Assist in packing the panel using bubble wrap or wooden box</li> <li>PC3. Gather detail information from project engineer or customer about the location/address for panel dispatch</li> <li>PC4. Dispatch the panel using a special courier service</li> </ul>
<b>Installation of panel onsite</b>	<ul style="list-style-type: none"> <li>PC5. Place the panel on a proper panel mounting plate</li> <li>PC6. Ensure that there is a cable trench below the panel to allow entry of cables from the cable duct below the panel</li> <li>PC7. Assist and guide onsite wireman to connect field cables to respective terminal base in the panel</li> <li>PC8. Also ensure that the other end of cable is connected to respective motor or other field accessories like encoder, output choke etc.</li> <li>PC9. Perform continuity test between field devices and terminal base before powering the panel</li> </ul>
<b>Panel testing with actual field devices</b>	<ul style="list-style-type: none"> <li>PC10. Connect necessary panel supply to the mains and Power on the panel</li> <li>PC11. Examine the communication of field devices with the VFD panel and monitor the status of these devices on operator panel</li> <li>PC12. Activate the Motor using commands from VFD software or forcing the output</li> <li>PC13. Inform project engineer and customer regarding completeness of field wiring and panel testing</li> <li>PC14. Prepare a signed report with the customer for panel commissioning onsite</li> </ul>
<b>Knowledge &amp; Understanding (K)</b>	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its	The user/individual on the job needs to know and understand: <ul style="list-style-type: none"> <li>KA1. Company's reporting structure</li> <li>KA2. Company's documentation policy</li> <li>KA3. Company's line of business and product offerings</li> <li>KA4. Company's departments involved with engineering</li> </ul>

IAS/N6302

**Dispatch, Installation and Commissioning of control panel**

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

IAS/N6302

**Dispatch, Installation and Commissioning of control panel**

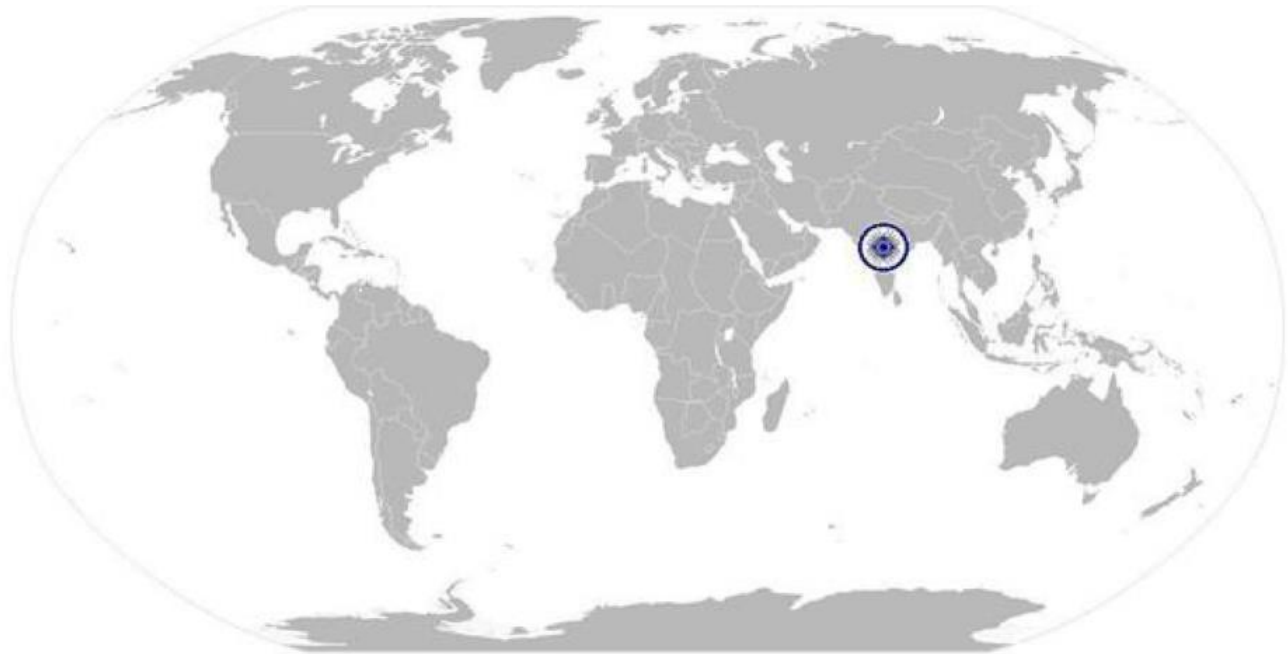
<b>B. Professional Skills</b>	<b>Decision Making</b>
	The user/individual on the job needs to know and understand how to: SB1. Make decisions pertaining to the scope of work SB2. Make decisions pertaining to use appropriate vendor for panel packing and dispatching SB3. Make decisions pertaining to readiness of site for panel installation SB4. Make decisions pertaining to commissioning of panel onsite
	<b>Plan and Organise</b>
	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
	<b>Customer Centricity</b>
	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
	<b>Problem Solving</b>
	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
	<b>Analytical Thinking</b>
	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
	<b>Critical Thinking</b>
	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 commissioning

IAS/N6302

Dispatch, Installation and Commissioning of control panel

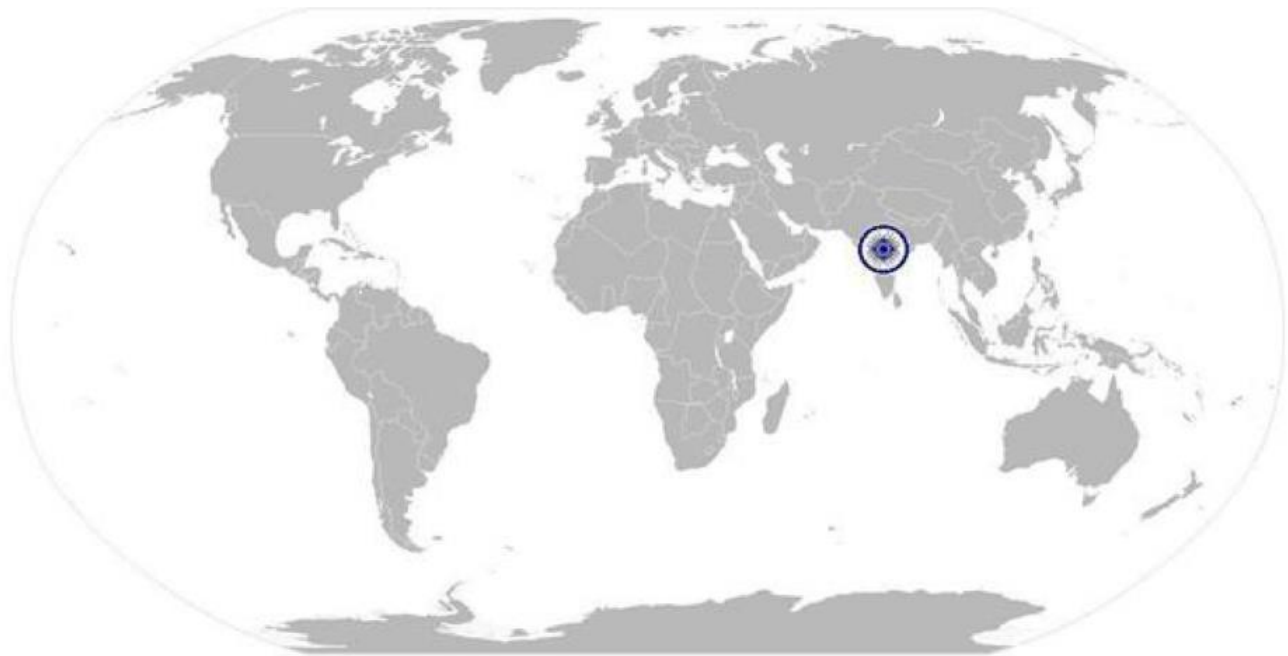
**NOS Version Control**

<b>NOS Code</b>	IAS/N3002		
<b>Credits (NSQF)</b>	TBD	<b>Version number</b>	1.0
<b>Industry</b>	Instrumentation Automation Surveillance & Communication	<b>Drafted on</b>	15/09/2017
<b>Industry Sub-sector</b>	Automation	<b>Last reviewed on</b>	15/09/2017
<b>Occupation</b>	VFD Panel designing, testing and troubleshooting	<b>Next review date</b>	15/09/2019



[Back on top...](#)

# National Occupational Standard



## Overview

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

**IAS/N2005**

**Health and Safety in Workplace**

National Occupational Standard

<b>Unit Code</b>	<b>IAS/N2005</b>
<b>Unit Title (Task)</b>	<b>Health and Safety in Workplace</b>
<b>Description</b>	This unit is about following adequate safety procedures to make work environment safe and healthy.
<b>Scope</b>	This unit/task covers the following: <ul style="list-style-type: none"> <li>• Following safety measures and standards</li> <li>• Maintaining good health and posture</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Following safety measures and standards</b>	To be competent, the individual must be able to: <ul style="list-style-type: none"> <li>PC1. Comply with general and special safety procedures followed in the Company</li> <li>PC2. Follow specified safety procedures while handling an equipment, hazardous material or tool</li> <li>PC3. Remove ties, finger rings, or any other metal objects which may interfere with the work</li> <li>PC4. Use safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.</li> <li>PC5. Escalate about any hazardous materials or things found in the premises</li> <li>PC6. Report about any breach of safety procedure in the company</li> <li>PC7. Ensure zero accidents at work</li> <li>PC8. Avoid damage of components due to negligence in ESD procedures</li> <li>PC9. Regularly participate in fire drills or other safety related workshops organized by the company</li> <li>PC10. Ensure no loss for company due to safety negligence</li> </ul>
<b>Maintaining good health and posture</b>	<ul style="list-style-type: none"> <li>PC11. Maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials</li> <li>PC12. Participate in company organized health sessions such as yoga, physiotherapy or games</li> <li>PC13. Handle heavy and hazardous materials with care and using appropriate tools and handling equipment such as trolleys, jacks and ladders</li> </ul>
<b>Knowledge &amp; Understanding (K)</b>	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	The individual on the job needs to know and understand: <ul style="list-style-type: none"> <li>KA1. Company's policies on: incentives, delivery standards, and personnel management</li> <li>KA2. Company occupational safety and health policies</li> <li>KA3. Company emergency evacuation procedure</li> <li>KA4. Company's medical policy</li> </ul>

**IAS/N2005**

**Health and Safety in Workplace**

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

**IAS/N2005**

**Health and Safety in Workplace**

	to work with the company
	<b>Problem Solving</b>
	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
	<b>Analytical Thinking</b>
	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
<b>Critical Thinking</b>	
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	



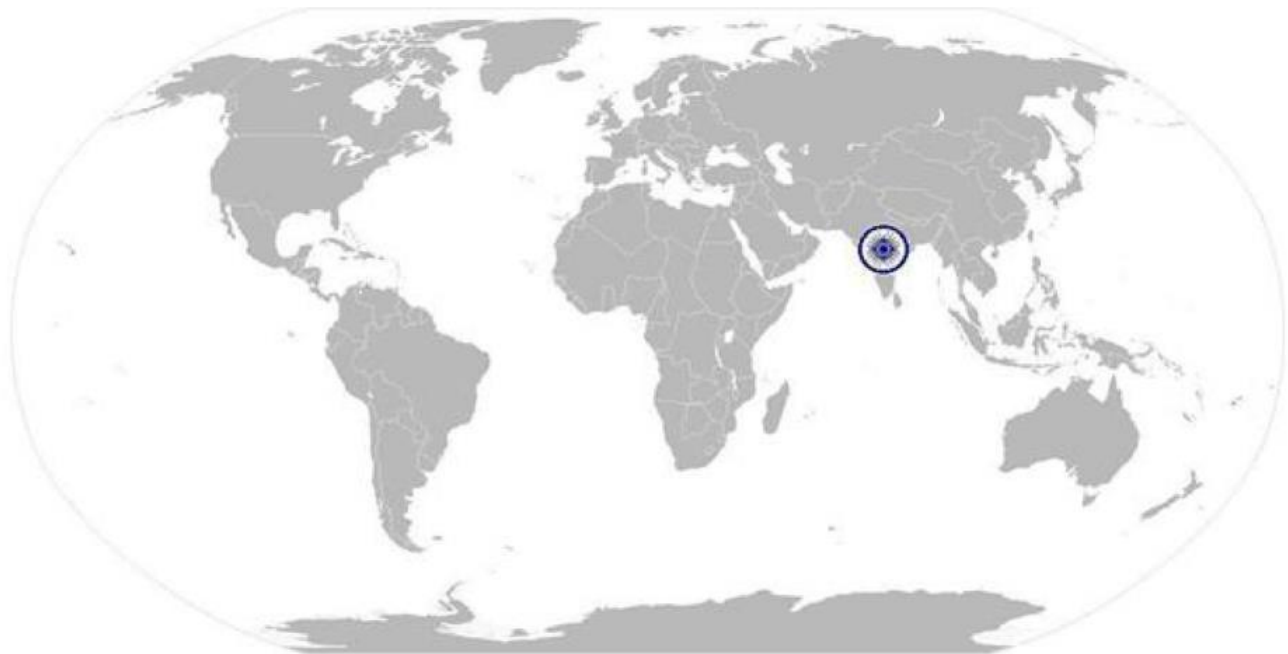


IAS/N2005

Health and Safety in Workplace

**NOS Version Control**

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

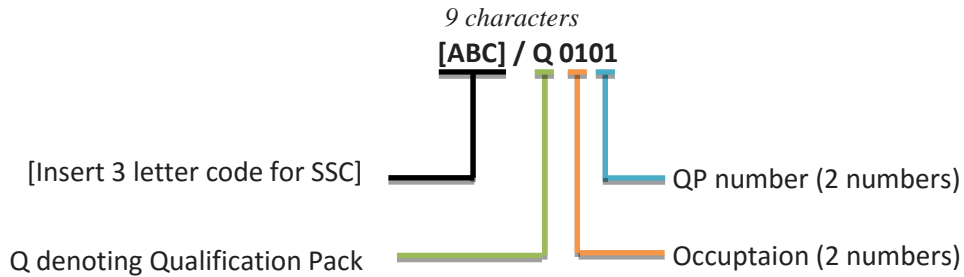


[Back on top...](#)

## Annexure

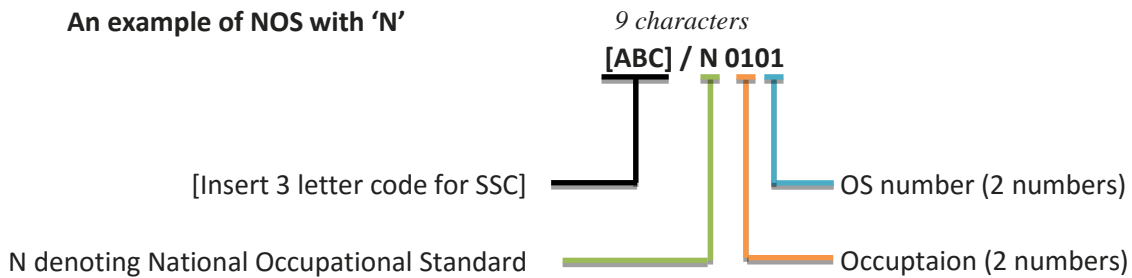
### Nomenclature for QP and NOS

#### 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 QP or NOS	N
Next two numbers	Occupation code	01
Next two numbers	OS number	01

[Back on top...](#)

## CRITERIA FOR ASSESSMENT OF TRAINEES

**Job Role** VFD Technician

**Qualification Pack** IAS/Q5604

**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 evaluations 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.

Assessment outcomes	Assessment Criteria for outcomes	Marks Allocation			
		Total Mark (385)	Out Of	Theory	Skills Practical
<b>1.IAS/N6300 Detailing and procurement of equipment used in VFD Control Panel</b>	PC1. Identify the customer requirement of the VFD Control Panel	<b>160</b>	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 and understand the application of the VFD and accordingly consider 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 considering Operating 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		10	5	5
	PC8. Select the VFD based on motor HP(Horse Power) and type of motor		10	10	0

	PC9. Interact with Project engineer to collect the material list regarding type of VFD		5	5	0
	PC10. Procure VFD modules and accessories required for mounting in panel		10	10	0
	PC11. Procure panel accessories like wires, ferrules, sleeves, terminal base, fans, tube light etc.		5	5	0
	PC12. Procure switchgear accessories like push buttons, switches, contactors and relays		5	5	0
	PC13. Prepare Input Output list of VFD for communication with the PLC inputs and outputs and get it approved from Project engineer or customer		10	0	10
	PC14. Assist draftsman to prepare engineering drawing for the panels and wiring diagrams for field connections		10	5	5
	PC15. Examine the drawings and get it approved from the Project engineer		5	0	5
	PC16. Assist and guide wireman for panel wiring		10	5	5
	PC17. Examine panel wiring using continuity test		5	0	5
	PC18. Examine the Mains power supply unit for powering the VFD Control panel		5	0	5
	PC19. Examine the wiring of the Digital and Analog terminals of VFD with other components inside the panel and with PLC input-output signals		5	0	5
	PC20. Examine special modules if used in panel for advance communications		5	0	5
		<b>Total</b>	160	95	65
<b>2.IAS/N6301 Testing the VFD Control Panel</b>	PC1. Collect information from project engineer to know Customer approved Software and use it for preliminary testing	<b>75</b>	10	5	5
	PC2. Ensure availability of others software's like Office, Adobe reader, Windows features etc. which are required for the VFD programming software.		5	5	0
	PC3. Ensure availability of the communication port on PC/Laptop and VFD		5	5	0
	PC4. Establish communication between programming software and VFD using appropriate protocol and cable		5	0	5
	PC5. Perform basic digital and analog input/output test using hardware components and VFD software commands		10	0	10
	PC6. Collect information from project engineer for type of Operating panel of VFD to be used		5	5	0

	PC7. Parameterize the VFD from Operating Panel and control the operation of motor in the plant		5	5	0
	PC8. Test operations of the motor from VFD programming software and monitor the status parameters on Operating panel of VFD		5	5	0
	PC9. Prepare a report for panel testing to Project engineer		5	0	5
	PC10. Invite customer for panel testing at panel manufacturing site		5	5	0
	PC11. Perform panel testing along with customer and explain him the panel details		10	5	5
	PC12. After completion of the Factory acceptance test prepare a signed report		5	0	5
		<b>Total</b>	75	40	35
<b>3.IAS/N6302 Dispatch, Installation and Commissioning of control panel</b>	PC1. After FAT ensure that the panel drawings are finalized and panel detail label is fixed on the panel	<b>80</b>	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 motor or other field accessories like encoder, output choke etc.		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 the communication of field devices with the VFD panel and monitor the status of these devices on operator panel		10	0	10
	PC12. Activate the Motor using commands from VFD software or forcing the output		5	0	5
	PC13. Inform project engineer and customer regarding completeness of field wiring and		5	5	0

	panel testing				
	PC14. Prepare a signed report with the customer for panel commissioning onsite		5	5	0
		<b>Total</b>	80	35	45
<b>4.IAS/N2005 Health and Safety in Workplace</b>	PC1. Comply with general and special safety procedures followed in the Company	<b>70</b>	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
	<b>Total</b>	70	30	40	

[Back on top...](#)