



QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR STRATEGIC MANUFACTURING 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..... [1]
2. Qualifications Pack..... [2]
3. Glossary of Key Terms [3]
4. OS Units..... [5]
5. Annexure: Nomenclature for QP & OS.. [36]
6. Assessment Criteria..... [38]

Introduction

Qualifications Pack- Design Engineer – Hull and Structures

SECTOR/S: STRATEGIC MANUFACTURING

SUB-SECTOR: Ship Building & Ship Repair

OCCUPATION: Ship Building

REFERENCE ID: SMC/Q 3301

ALIGNED TO: NCO-2015/NIL, ISCO - NIL

Brief Job Description: Design Engineer-Hull & Structures is responsible for designing the hull and structures of a ship including the form and stability of hulls and obtain design validations from the production and maintenance teams.

Personal Attributes: He should be able to work effectively within a design team environment. He should have excellent communication and interpersonal skills, strong attention to detail and accuracy, good logical, mathematical and presentation skills. Also, understanding the need to take initiative and manage self and work to improve efficiency and effectiveness.



Qualifications Pack- Design Engineer – Hull and Structures

Job Details

Qualifications Pack Code	SMC/Q 3301		
Job Role	Design Engineer – Hull and Structures		
Credits (NSQF)	TBD	Version number	1.0
Sector	Strategic Manufacturing	Drafted on	05/11/2016
Sub-sector	Ship Building and Ship Repair	Last reviewed on	13/09/2017
Occupation	Ship Building	Next review date	12/09/2020
NSQC Clearance on	NA		

Job Role	Design Engineer – Hull and Structures
Role Description	Design Engineer-Hull & Structures is responsible for designing the hull and structures of a ship including the form and stability of hulls and obtain design validations from the production and maintenance teams.
NSQF level	7
Minimum Educational Qualifications	Engineering Graduate in marine engineering
Maximum Educational Qualifications	N/A
Prerequisite License or Training	Training in designing software of ship building
Minimum Job Entry Age	23 years
Experience	2 year experience in engineering design
Applicable National Occupational Standards (NOS)	<p>Compulsory NOS:</p> <ol style="list-style-type: none"> SMC/N 3301 Planning for design of ship structures SMC/N 3302 Formulate design of hull and structures SMC/N 9103 Work effectively in a collaborative environment SMC/N 9104 Maintain safe, hygiene and secure environment
Performance Criteria	As described in the relevant OS units



Qualifications Pack- Design Engineer – Hull and Structures

Definitions

Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar businesses and interest. 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 In an industry.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through analysis and form the basis of OS.
Job Role	Job role defines a unique set of functions that together form a unique Employment opportunity in an organization.
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.
NOS	NOS are Occupational Standards which apply uniquely in the Indian context.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Qualifications Pack	Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Unit Code	Unit Code is a unique identifier for an Occupational Standard , which is denoted by an 'N'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for
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.



Qualifications Pack- Design Engineer – Hull and Structures

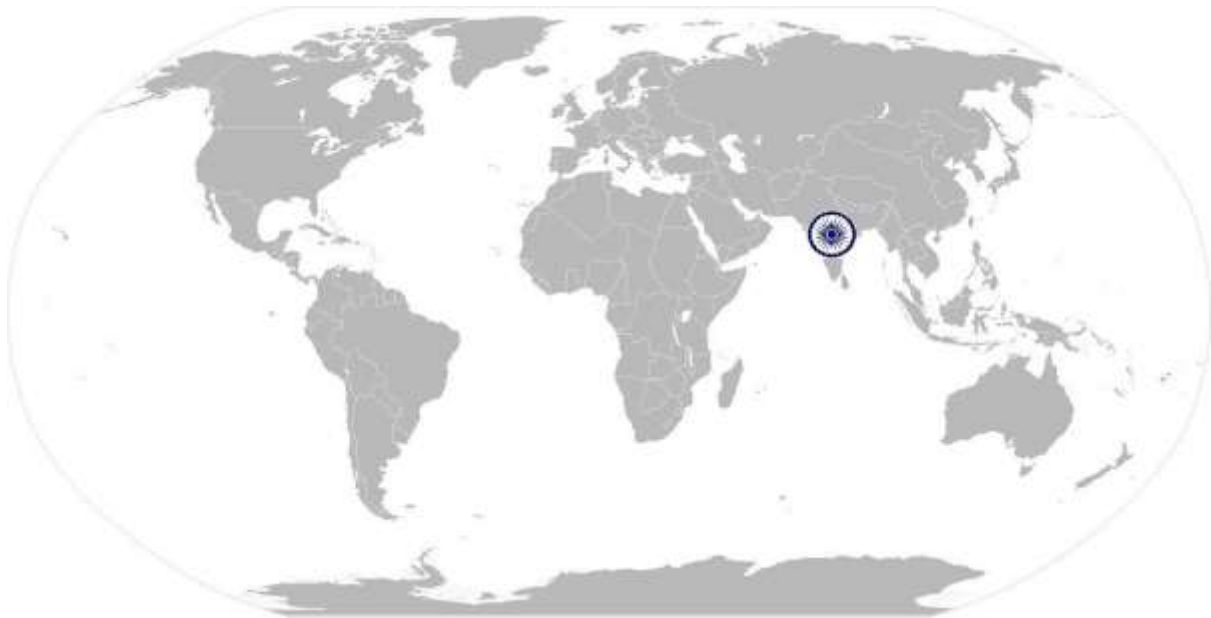
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills or Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.

Acronyms

Keywords /Terms	Description
SMSSC	Strategic Manufacturing Sector Skill Council
NOS	National Occupational Standards
NSQF	National Skills Qualification Framework
NVEQF	National Vocational Educational Qualification Framework
NVQF	National Vocational Qualification Framework
OS	Occupational Standards
PC	Performance Criteria
QP	Qualification Pack
SSC	Sector Skills Council



National Occupational Standard



Overview

This unit is about planning for design of ship structures



SMC/N 3301

Planning for design of ship structures

National Occupational Standard

Unit Code	SMC/N 3301
Unit Title (Task)	Planning for designing of ship structures
Description	This unit is about planning for designing of ship structures
Scope	This unit/task covers the following: <ul style="list-style-type: none"> • Assessment of basic design requirements of ship • Planning for design of hull and structures
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Assessment of basic design requirements of ship	To be competent, the user/ individual must be able to: <ul style="list-style-type: none"> PC1. perform basic calculations and collate the design data from various sources PC2. analyse the various ship systems and their general arrangement/location PC3. analyse the specific tasks applicable to assessment of design requirements in different phase of ship design PC4. submit work measurement record, progress and output PERT charts PC5. incorporate readings to refine design of follow on vessels PC6. provide technical and logistics documentation relative to recommended design and performance requirements
Planning for design of hull & structures	To be competent, the user/ individual must be able to: <ul style="list-style-type: none"> PC7. operate 2D/3D software and drafting workstations to make 2D/3D layout of Ship Hull and Structure design PC8. study existing hull and structural drawings of the vessel PC9. analyse design proposals and specifications to establish basic characteristics of a hull such as size, weight and speed PC10. prepare for the design activities of hull PC11. perform basic design verification and modifications PC12. develop basic sectional and waterline curves of the hull and structure to establish the centre of gravity, ideal hull and structure form, and data on buoyancy and stability PC13. plan for mechanical and electrical design principles to support engineering, production PC14. integration of various components of Hull & Structure on drawing board
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the organization and its processes)	The user/individual on the job needs to know and understand: <ul style="list-style-type: none"> KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA2. all types of ships such as cargo ships, passengers ships, war ships, frigate, crew ships, tankers, etc KA3. types of fishing vessel – small, medium and large KA4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA5. relevant people and their responsibilities within the work area KA6. reporting structure, inter- dependent functions, lines and procedures in the



SMC/N 3301

Planning for design of ship structures

	<p>work area</p> <p>KA7. escalation matrix and procedures for reporting work and employment related issues</p> <p>KA8. documentation and related procedures applicable in the context of employment and work</p> <p>KA9. importance and purpose of documentation in context of employment and work</p> <p>KA10. company systems for recording design information</p>
<p>B. Technical Knowledge</p>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. purpose of design brief and its importance</p> <p>KB2. how to interpret isometric drawings, imperial and metric systems of measurement, work-piece reference points and system of tolerance</p> <p>KB3. how to measure internal and external dimensions, measuring geometric features</p> <p>KB4. the key elements and be able to understand the integration of the numerous systems of a naval ship during the design process</p> <p>KB5. understanding of the engineering requirements and standards which are applicable to the design of naval ships</p> <p>KB6. marine design, practices in marine design, ship building process</p> <p>KB7. bassel conventions on maritime industry</p> <p>KB8. layout of various types of ship</p> <p>KB9. classification rules and design norms of different types of ships</p> <p>KB10. how to operate computer-aided design (CAD) to make 2D/3D layout of Hull Design</p> <p>KB11. practices of marine design and ship building process</p> <p>KB12. structural calculation, structural analysis and design</p>
<p>Skills (S)</p>	
<p>A. Core Skills/ Generic Skills</p>	<p>Writing Skills</p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. prepare and maintain documentation</p> <p>SA2. fill up appropriate technical forms, process charts and activity logs</p> <p>Reading Skills</p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA3. read vernacular/english language</p> <p>SA4. read and understand manuals, health and safety instructions, memos, other company documents</p> <p>SA5. read from different sources- books, screens in machines and signage</p> <p>SA6. read various colour codes, as per standard electrical, mechanical and civil nomenclature</p> <p>Oral Communication (Listening and Speaking skills)</p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA7. express statements or information clearly so that others can hear and understand</p> <p>SA8. participate in and understand the main points of simple discussions</p>



SMC/N 3301

Planning for design of ship structures

	<p>SA9. respond appropriately to any queries</p> <p>SA10. communicate with peers, superiors and sub-ordinates</p> <p>SA11. convey and share technical information clearly using appropriate language</p> <p>SA12. communicate with people in respectful form and manner in line with organizational protocol</p> <p>SA13. put forward one's point of view in a convincing manner</p>
B. Professional Skills	Decision making
	The user/individual on the job needs to know and understand how to:
	SB1. follow organisation rule- based decision making process
	SB2. take decision with systematic course of actions and/or response
	SB3. work towards achieving better results for self, others and organization
	Plan and organize
	The user/individual on the job needs to know and understand how to:
SB4. plan and organize work schedule to meet deadlines	
SB5. work constructively and collaboratively with others	
SB6. seek to improve and modify own work practices	
SB7. undertake and express new ideas and initiative to others	
Analytical thinking	
The user/individual on the job needs to know and understand how to:	
SB8. apply domain knowledge, observations and data to select course of action to perform tasks	
SB9. analyse information according to enterprise and work requirements	
SB10. provide suggestions to further streamline process	
Critical thinking	
SB11. apply balanced judgements to different situations	
SB12. select and apply resolution techniques	
SB13. use reasoning skills to identify and resolve basic problems	
SB14. use acquired knowledge of the process and apply the information gathered from observation, experience, reasoning, or communication to act efficiently	

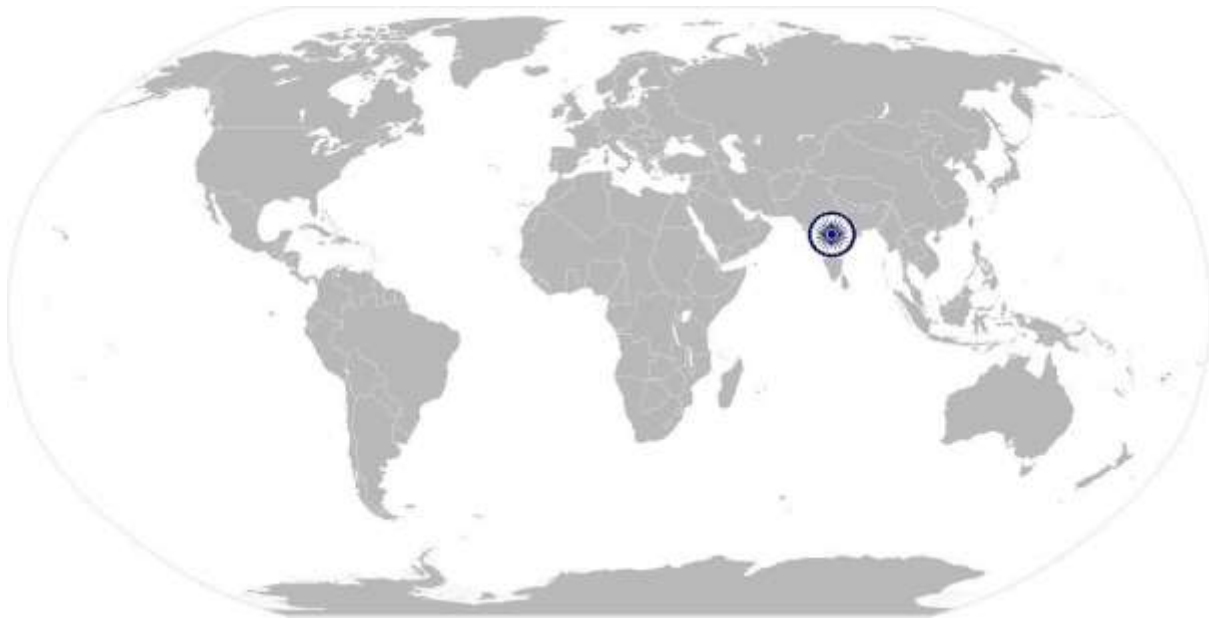


SMC/N 3301

Planning for design of ship structures

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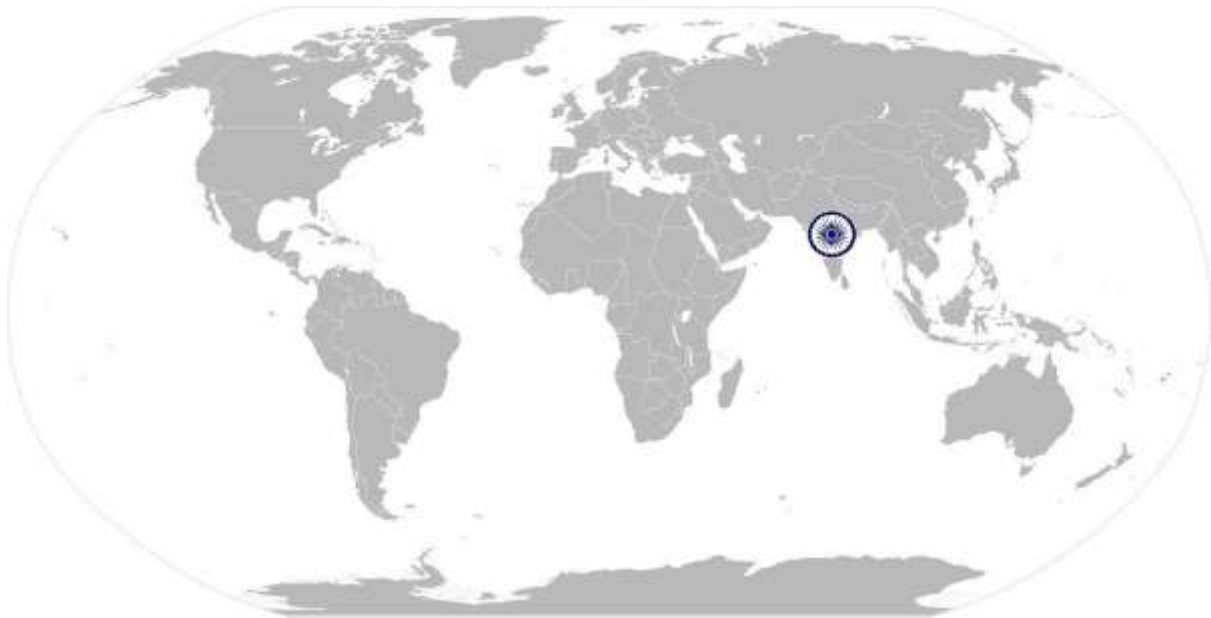
NOS Code	SMC/N 3301		
Credits (NSQF)	TBD	Version number	1.0
Industry	Strategic Manufacturing	Drafted on	05/11/2016
Industry Sub-sector	Ship Building and Ship Repair	Last reviewed on	13/09/2017
Occupation	Ship Building	Next review date	12/09/2020



[Back to Top](#)



National Occupational Standard



Overview

This unit is about formulating design of hull and structures



SMC/N 3302

Formulate design of hull and structures

National Occupational Standard

Unit Code	SMC/N 3302
Unit Title (Task)	Formulate design of hull and structures
Description	This unit is about formulating design of hull and structures
Scope	This unit/task covers the following: <ul style="list-style-type: none"> • Designing of hull • Designing of internal structures
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Designing of hull	To be competent, the user/ individual must be able to: <ul style="list-style-type: none"> PC1. formulate software designs in support of shipboard Hull such as auxiliary equipment designs, hull conditions PC2. design the layout of ships' interiors including cargo space and ladder wells PC3. support in review specifications that relate to Hull Design PC4. support in technical manuals and other technical documentation that relate to Hull Design PC5. take and maintain records from the quality team on conducted hull surveys
Designing of internal structures	<ul style="list-style-type: none"> PC6. formulate software designs in support of mechanical and electrical systems such as machinery controller designs, deck crane systems, habitability spaces and other shipboard spaces PC7. design the layout of ship's interiors including passenger compartments and elevators PC8. draft marks, plimsoll marks, load line marks at the final dimension stage PC9. take and maintain records from the quality team on conducted welding inspection, strength tests and material tensile tests PC10. verify the drawings and carry out requisite modifications
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the organization and its processes)	The user/individual on the job needs to know and understand: <ul style="list-style-type: none"> KA1. company systems for recording design information KA2. importance of using the company information systems KA3. limits of learner's own authority, and to whom should they report if they have problems that they cannot resolve KA4. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA5. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA6. relevant people and their responsibilities within the work area KA7. importance of working in different shifts
B. Technical Knowledge	The user/individual on the job needs to know and understand: <ul style="list-style-type: none"> KB1. naval ship design & engineering KB2. structural statics, naval architectural calculation KB3. fundamentals of fluid mechanics, structural dynamics, marine hydrodynamics,



SMC/N 3302

Formulate design of hull and structures

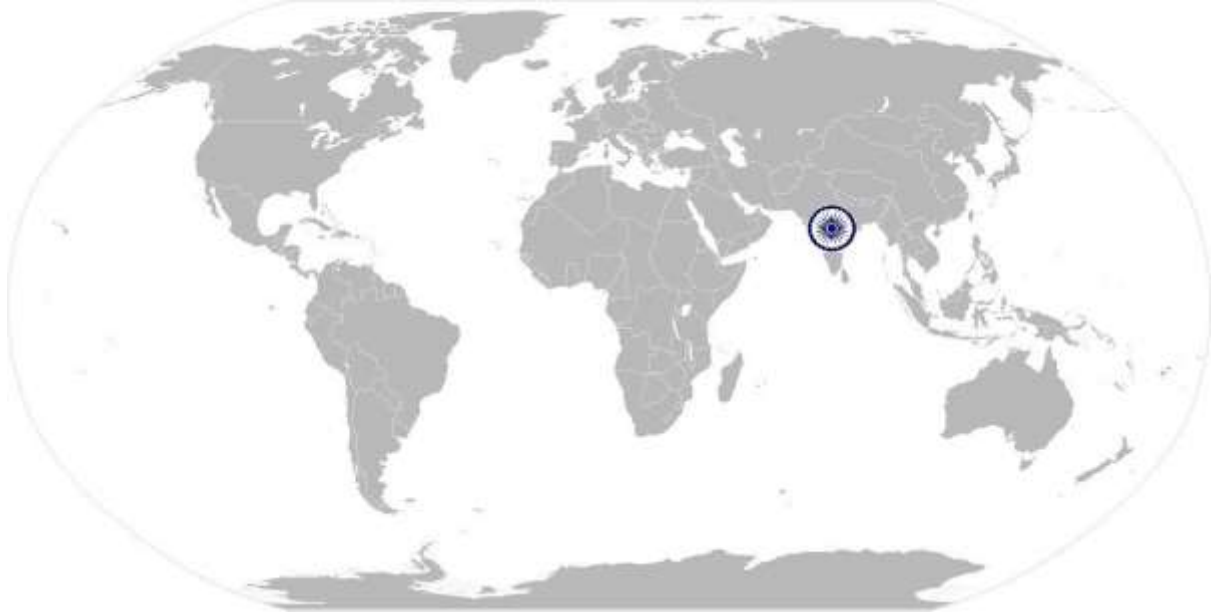
	<p>ship Resistance and propulsion, marine mechanics of materials and theory of vibration</p> <p>KB4. various sources for information for the design brief</p> <p>KB5. how to obtain and interpret legislative and regulatory documentation</p> <p>KB6. types of design features that should be considered unique or specific</p> <p>KB7. information and level of detail to be included in a design brief</p> <p>KB8. importance of identifying design constraints</p> <p>KB9. different types of design briefs</p> <p>KB10. regulations, directive and guidelines that are relevant</p>
Skills (S)	
<p>A. Core Skills/ Generic Skills</p>	<p>Writing Skills</p>
	<p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. prepare and maintain documentation</p> <p>SA2. complete accurate well written work with attention to detail</p>
	<p>Reading Skills</p>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SA3. read vernacular/english language</p> <p>SA4. read and understand manuals, health and safety instructions, memos, other company documents</p> <p>SA5. read from different sources- books, screens in machines and signage</p> <p>SA6. read various colour codes, as per standard electrical, mechanical and civil nomenclature</p> <p>SA7. follow guidelines, procedures and rules</p>
	<p>Oral Communication (Listening and Speaking skills)</p>
<p>The user/individual on the job needs to know and understand how to:</p> <p>SA8. express statements or information clearly so that others can hear and understand</p> <p>SA9. participate in and understand the main points of simple discussions</p> <p>SA10. respond appropriately to any queries</p> <p>SA11. communicate with peers, superiors and sub-ordinates</p> <p>SA12. convey and share technical information clearly using appropriate language</p> <p>SA13. put forward one's point of view in a convincing manner</p>	
<p>B. Professional Skills</p>	<p>Decision making</p>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. follow organisation rule- based decision making process</p> <p>SB2. take decision with systematic course of actions and/or response</p> <p>SB3. take decisions within own jurisdiction or take approval for case outside own jurisdiction</p>
	<p>Plan and organize</p>
<p>The user/individual on the job needs to know and understand how to:</p> <p>SB4. plan and organize work schedule to meet deadlines</p> <p>SB5. work constructively and collaboratively with others</p> <p>SB6. store and retrieve information</p> <p>SB7. keep up to date with changes, procedures and practices in your field of</p>	



SMC/N 3302

Formulate design of hull and structures

	expertise
	SB8. seek to improve and modify own work practices
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB9. apply domain knowledge, observations and data to select course of action to perform tasks SB10. analyse information according to enterprise and work requirements SB11. undertake and express new ideas and initiative to others
	Critical thinking
	SB12. apply balanced judgements to different situations SB13. provide opinions on work in a detailed and constructive way SB14. achieve more by applying one's competencies in new and different situations and contexts



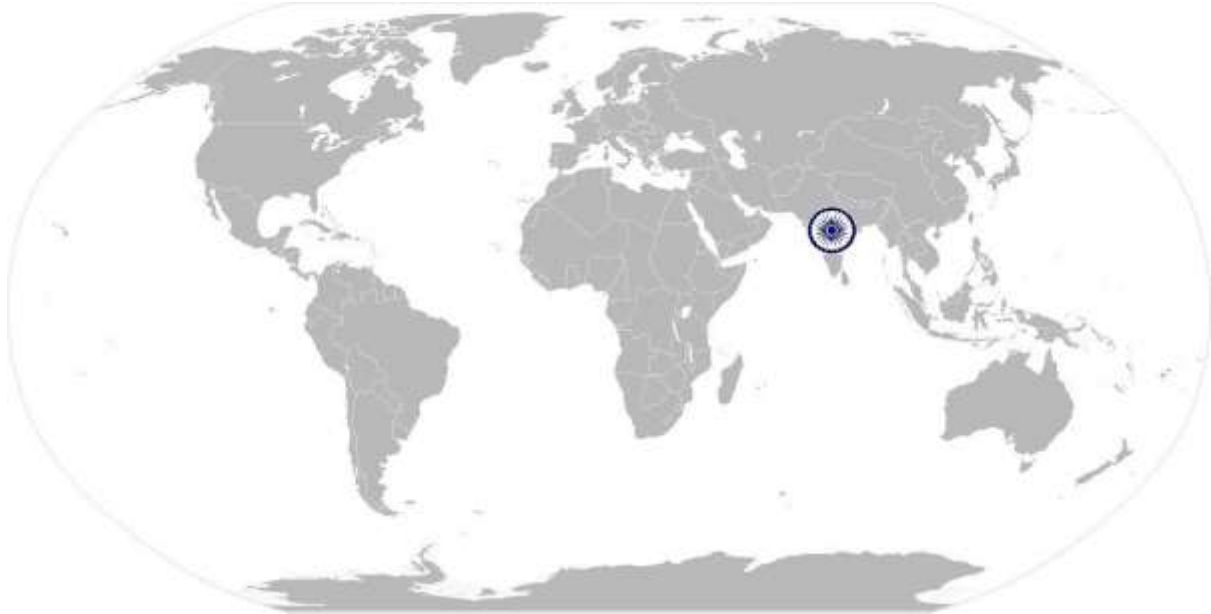


SMC/N 3302

Formulate design of hull and structures

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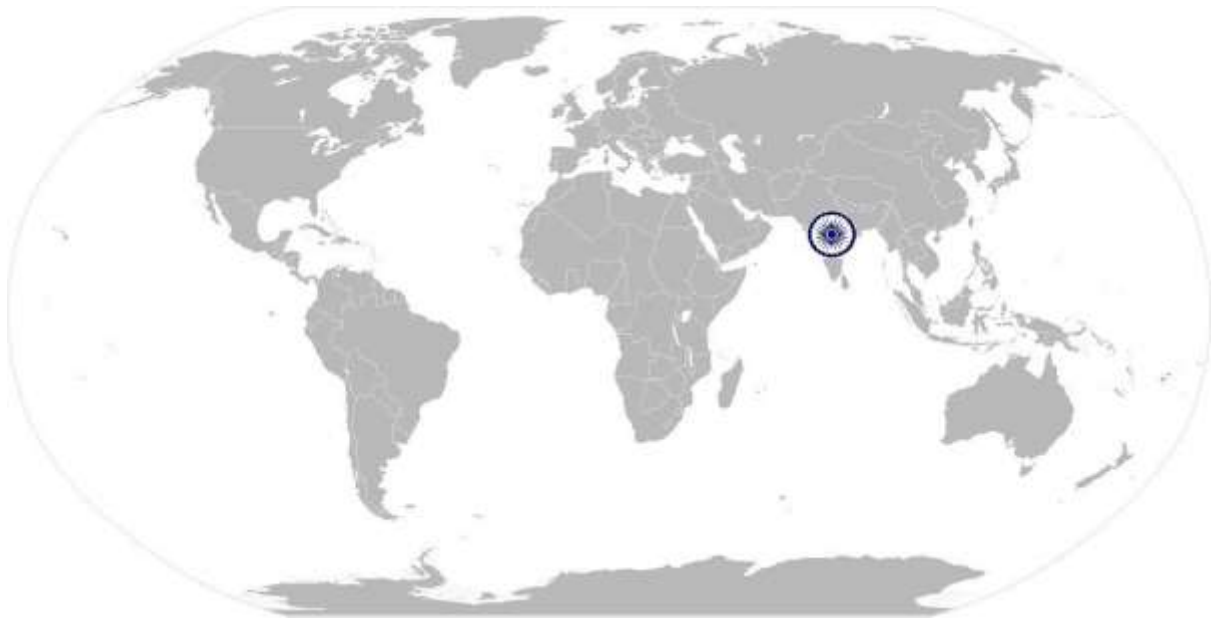
NOS Code	SMC/N 3302		
Credits (NSQF)	TBD	Version number	1.0
Industry	Strategic Manufacturing	Drafted on	05/11/2016
Industry Sub-sector	Ship Building & Ship Repair	Last reviewed on	13/09/2017
Occupation	Ship Building	Next review date	12/09/2020



[Back to top...](#)



National Occupational Standard



Overview

This unit covers basic practices for working effectively with others in a collaborative environment, such as team work and cooperation, awareness of team and organisational goals, sharing of information, communicating effectively using appropriate etiquettes and behaviours, and interpersonal relations



SMC/N 9103

Work effectively in a collaborative environment

National Occupational Standard

Unit Code	SMC/ N 9103
Unit Title (Task)	Work effectively in a collaborative environment
Description	This unit covers basic practices for working effectively with others in a collaborative environment, such as team work and cooperation, awareness of team and organisational goals, sharing of information, communicating effectively using appropriate etiquettes and behaviours, and interpersonal relations.
Scope	<p>This unit/task covers the following: Activities covered:</p> <ul style="list-style-type: none"> • Working effectively in a team • Etiquettes and behaviors for: <ul style="list-style-type: none"> • understanding & sharing information with others to enable efficient delivery of work • communicating with other members and people internal or external to the organization • Interpersonal relations
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Working effectively in a team	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC1. define own work and responsibilities PC2. understand organisational, individual and team goals PC3. understand work requirements and assigned targets PC4. identify team members and other persons responsible for preceding and successive activities PC5. identify any problems with team members and take initiative to solve problems in a positive manner PC6. carry out any commitments made to others PC7. work together as a single unit to ensure efficiency in work PC8. ensure proper care is given to a fellow worker in case of an accident</p>
Etiquettes and behaviors for sharing information and communicating effectively	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC9. give feedback of work done and report problems identified in the field PC10. communicate with other people clearly and effectively PC11. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC12. etiquettes may include: <ul style="list-style-type: none"> • use appropriate titles and terms of respect • use polite language • avoid casual expressions PC13. display active listening skills while interacting with others at work PC14. demonstrate responsible and disciplined behavior</p>



SMC/N 9103

Work effectively in a collaborative environment

<p>Interpersonal relations</p>	<p>To be competent, the user/individual on the job must be able to: PC15. develop understanding, goodwill and trust with team members PC16. resolve individual disagreements with the concerned person PC17. recognize when a conflict situation exists and try to resolve amicably PC18. follow the organisation’s policies and procedures to resolve conflicts</p>
<p>Knowledge and Understanding (K)</p>	
<p>A. Organizational Context (Knowledge of the organization and its processes)</p>	<p>The user/individual on the job needs to know and understand: KA1. organization’s policies and procedures for working with colleagues KA2. organisational chart and project schedules KA3. work flow in the organization KA4. relevant people and their responsibilities within the work area KA5. effective working relationships with both internal and external the people with which the individual is required to interact KA6. procedures in the organization to deal with conflicts KA7. benefits of developing productive working relationships with colleagues</p>
<p>B. Technical Knowledge</p>	<p>The user/individual on the job needs to know and understand: KB1. organizational goals and objectives, individual and team performance KB2. formation and characteristics of teams, stages in team development KB3. importance of team work in organizational and individual success KB4. importance of developing effective working relationships KB5. importance of building rapport through collaboration and mutual support KB6. importance of knowledge sharing for effective working KB7. importance of tone and pitch in effective communication KB8. key elements of active listening KB9. importance of communicating clearly and effectively with people face-to-face, by telephone and in writing KB10. importance of effective working relationships and how these contribute towards effective working relationships on a day-to-day basis KB11. how to deal with difficult working relationships with people to sort out problems KB12. importance of discipline for professional success KB13. common reasons for interpersonal conflicts KB14. process of resolving interpersonal conflicts KB15. importance and ways of managing interpersonal conflict effectively KB16. expressing and addressing grievances appropriately and effectively</p>
<p>Skills (S)</p>	
<p>A. Core Skills/ Generic Skills</p>	<p>Writing Skills The user/ individual on the job needs to know and understand how to: SA1. prepare and maintain documentation</p> <p>Reading Skills The user/individual on the job needs to know and understand how to: SA2. read vernacular/English language SA3. read and understand manuals, health and safety instructions</p>



SMC/N 9103

Work effectively in a collaborative environment

	SA4. read various colour codes, as per standard electrical, mechanical and civil nomenclature
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to:
	SA5. express statements or information clearly so that others can hear and understand
	SA6. participate in and understand the main points of simple discussions
	SA7. respond appropriately to any queries
	SA8. communicate with employees
B. Professional Skills	Decision making
	The user/individual on the job needs to know and understand how to:
	SB1. follow organization rule- based decision making process
	SB2. take decision with systematic course of actions and/or response
	Plan and organize
	The user/individual on the job needs to know and understand how to:
	SB3. plan and organize work schedule to meet deadlines
	SB4. how to improve the work process
	Team Working Skills
	The user/individual on the job needs to know and understand how to:
	SB5. work constructively and collaboratively with others
	SB6. build rapport and cooperative relationships with internal team members and other departments for effective completion of work
	SB7. resolve conflicts within teams
	Analytical thinking
	The user/individual on the job needs to know and understand how to:
	SB8. apply domain knowledge, observations and data to select course of action to perform tasks



SMC/N 9103

Work effectively in a collaborative environment

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NOS Code	SMC/N 9103		
Credits (NSQF)	TBD	Version number	1.0
Industry	Strategic Manufacturing	Drafted on	05/11/2016
Industry Sub-sector	Common	Last reviewed on	13/09/2017
Occupation	Common	Next review date	12/09/2020

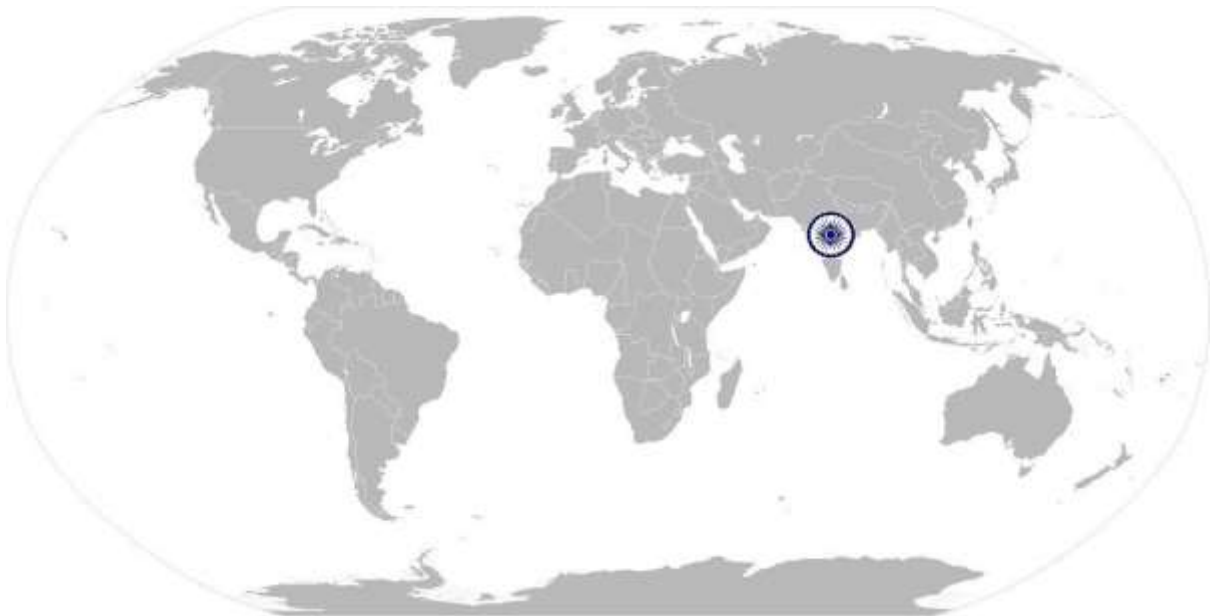


[Back to Top](#)



SMC/N 9104 Maintain a healthy, safe and secure working environment

National Occupational Standard



Overview

This unit covers procedures and practices to be followed to maintain a healthy, safe and secure work environment.



SMC/N 9104 Maintain a healthy, safe and secure working environment

National Occupational Standard

Unit Code	SMC/N 9104
Unit Title (Task)	Maintain a healthy, safe and secure working environment
Description	This unit is about maintaining a healthy, safe and secure work environment. It covers responsibilities towards self, others, assets and the environment.
Scope	<p>This unit/task covers the following:</p> <p>Activities covered:</p> <ul style="list-style-type: none"> • maintain healthy workplace environment • maintain safe and secure environment • fire safety • emergencies, rescue and first-aid procedures
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Maintain healthy workplace	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC1. maintain cleanliness and hygiene</p> <p>PC2. wear clean and appropriate clothing, footwear and headgear</p> <p>PC3. follow health and hygiene procedures in all the work at all times</p> <p>PC4. identify common health hazards and symptoms for self and other crew members related to exposure of confined spaces, radiant energy during welding and cutting, anti fouling and anti – rust additives</p>
Maintain safe and secure environment	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC5. keep a look out for hazards in the workplace related to equipment and personal clothing</p> <p>PC6. use protective clothing such as gloves and safety glasses for specific tasks & work conditions</p> <p>PC7. keep a lookout for following Accommodation related safety aspects</p> <ul style="list-style-type: none"> • all emergency lights operational, color coded and marked with "E" • escape routes unobstructed; exits clearly marked • safety signs and placards posted and clearly readable • life jackets, immersion suits & EEBDs correctly stowed & marked • internal communications equipment tested and operating correctly • muster list signed and properly displayed at appropriate locations <p>PC8. keep a lookout for the following Machinery Spaces related safety aspects</p> <ul style="list-style-type: none"> • escape routes, ladders and emergency exits unobstructed and clearly marked • all handrails, guard-rails and safety guards correctly fitted and secured to protect against fall • spare life-jackets marked and in good order, emergency equipment accessible and operational • all lights operational, stairways and work areas adequately lit,



SMC/N 9104 Maintain a healthy, safe and secure working environment

	<ul style="list-style-type: none">emergency lighting in E/R checked• safety signs and placards posted and clearly readable• switchboard area clear and free of obstructions and rubber mats in position• all portable fire extinguishers correctly stowed, accessible and inspection dated• all fixed fire-fighting equipment unobstructed and in good condition• high voltage areas clearly marked• protective guards for rotating machinery properly secured in place• steering gear space free from oil, gratings or non-slip surfaces in place around the steering gear• shielding of high pressure fuel pipes in place, steam pipes properly insulated• self-closing device on sounding pipes and glass level gauges functional & not tied in open position• low clearance limits stripe marked• oil soaked rags and other flammable materials kept in covered non-combustible bins• supplies and materials properly stored• chemicals properly labelled and stored, acids & alkalis segregated, MSDS & PPE available at site• approved First Aid supplies readily available, accessible and clearly marked <p>PC9. keep a lookout for the following Deck Area related safety aspects</p> <ul style="list-style-type: none">• escape routes and embarking areas marked, unobstructed and no slipping and tripping hazards• “Danger-Enclosed Space” marked outside all such spaces having access other than via manholes• all deck lights operational and in sound enclosures• all safety & hazard zone identification signs posted & readable, fire plan wallets updated• all lifebuoys correctly stowed, life buoy lights and smoke markers valid & in good condition• lifeboats in good condition• decks and walkways free form oil / grease and is there anti-slip paint at mooring areas• piping systems on deck are properly clamped• watertight doors closing properly with packing in good condition• all weather tight hatches closing properly with packing in good condition• good health of oil pollution clean-up equipment and their storage locations clearly marked• supplies and materials are properly stored
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SMC/N 9104 Maintain a healthy, safe and secure working environment

	<ul style="list-style-type: none"> • all cans in paint store are closed, cargo & bunker samples on tankers are stowed in paint store • provision and easy accessibility of Material Safety Data Sheet (MSDS)
Fire safety	<p>To be competent ,the user/individual on the job must be able to:</p> <p>PC10. use appropriate fire extinguishers on different types of fires correctly</p> <p>PC11. ensure all portable fire extinguishers & stowage locations numbered in place & inspection dated for safety reasons</p> <p>PC12. fire station not locked but only sealed</p> <p>PC13. demonstrate rescue techniques applied during fire hazard</p> <p>PC14. demonstrate good housekeeping in order to prevent fire hazards</p> <p>PC15. demonstrate the correct use of a fire extinguisher</p>
Emergencies, rescue and first-aid procedures	<p>To be competent ,the user/individual on the job must be able to:</p> <p>PC16. demonstrate how to free a person from electrocution, as per laid down procedure</p> <p>PC17. administer appropriate first aid to victims where required</p> <p>PC18. demonstrate basic techniques of bandaging</p> <p>PC19. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments</p> <p>PC20. Emergency procedures include raising alarm, safe evacuation, etc</p> <p>PC21. perform and organize loss minimization</p> <p>PC22. rescue activity during an accident in real or simulated environments</p> <p>PC23. administer basic first aid to victims</p> <p>PC24. demonstrate correct method to move injured people and others during an emergency</p>
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. responsibilities under the organization’s health, safety and security standards</p> <p>KA2. why it is important to work in a healthy, safe and hygienic way</p> <p>KA3. where one can get information about health, hygiene and safety at the workplace</p> <p>KA4. names of all the people responsible for health and safety in a workplace</p> <p>KA5. names and location of documents that refer to health and safety in the workplace</p>
B. Technical Knowledge	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. general rules on hygiene that one must follow</p> <p>KB2. why correct clothing, footwear, safety masks, respiratory masks, gloves, loose cotton and headgear should be worn at all times</p> <p>KB3. the adverse health effects that may be caused by the exposure to a hazard</p> <p>KB4. the physical signs and reactions related to exposures to such hazards</p> <p>KB5. proper use of barriers that may be needed to protect an entrant from hazards</p> <p>KB6. entry and exit of vessel and evacuation procedures in case of an emergency</p> <p>KB7. what personal protective equipment is needed for safe entry into and exit from the space</p>



SMC/N 9104 Maintain a healthy, safe and secure working environment

	<p>KB8. emergency indicators like sirens and what it indicates</p> <p>KB9. precautions to be taken in confined spaces</p> <p>KB10. methods of prevention of fires like proper and safe disposal of inflammable material, maintenance of proper ventilation in enclosed spaces, temperature control in working areas</p> <p>KB11. precautions to be taken to be taken while working in heights like safety nets, length of rope and other safety practices in marine industry</p> <p>KB12. ratings of motors and precautions to taken while dealing with electrical equipment</p> <p>KB13. awareness of work going on in surrounding areas</p> <p>KB14. awareness of gasses generated on board of ship</p> <p>KB15. awareness of toxic gases in confined spaces</p> <p>KB16. possible causes of risk, hazard or accident in the workplace</p> <p>KB17. methods of accident prevention</p> <p>KB18. where to find first aid equipment and who the registered first-aider is in the workplace</p> <p>KB19. safe lifting and handling techniques to be followed</p> <p>KB20. rescue techniques applied during a fire hazard</p> <p>KB21. where to find fire alarms and how to set them off</p> <p>KB22. organization’s security procedures and why these are important</p> <p>KB23. various dangers associated with the use of electrical equipment</p> <p>KB24. preventive and remedial actions to be taken in the case of exposure to toxic materials</p> <p>KB25. various types of safety signs and what they mean</p> <p>KB26. appropriate basic first aid treatment relevant to the condition</p> <p>KB27. appropriate person safe working practices while working at various hazardous sites</p>
Skills (S)	
C. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to:
	SA1. prepare and maintain documentation
	Reading Skills
	The user/individual on the job needs to know and understand how to:
SA2. read vernacular/english language	
SA3. read and understand health and safety instructions	
SA4. read various colour codes, as per standard electrical, mechanical and civil nomenclature	
Oral Communication (Listening and Speaking skills)	
The user/individual on the job needs to know and understand how to:	
SA5. express statements or information clearly so that others can hear and understand	
SA6. participate in and understand the main points of simple discussions	
SA7. respond appropriately to any queries	



SMC/N 9104 Maintain a healthy, safe and secure working environment

	SA8. communicate with employees
D. Professional Skills	Decision making
	The user/individual on the job needs to know and understand how to: SB1. follow organisation rule- based decision making process SB2. take decision with systematic course of actions and/or response
	Plan and organize
	The user/individual on the job needs to know and understand how to: SB3. plan and organize work schedule to meet deadlines SB4. work constructively and collaboratively with others
	Analytical thinking
The user/individual on the job needs to know and understand how to: SB5. apply domain knowledge, observations and data to select course of action to perform tasks related to domain SB6. identify cause and effect relations in their area of work SB7. use cause and effect relations to anticipate potential problems and their solutions	

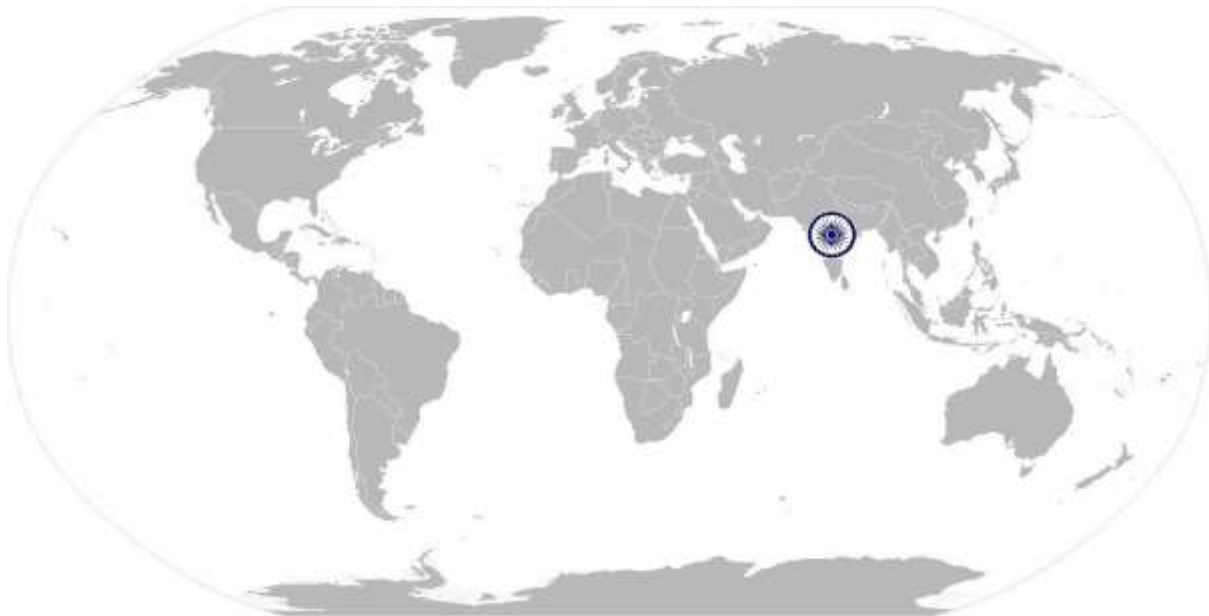




SMC/N 9104 Maintain a healthy, safe and secure working environment

NOS Version Control

NOS Code	SMC/N 9104		
Credits (NSQF)	TBD	Version number	1.0
Industry	Strategic Manufacturing	Drafted on	05/11/2016
Industry Sub-sector	Common	Last reviewed on	13/09/2017
Occupation	Common	Next review date	12/09/2020



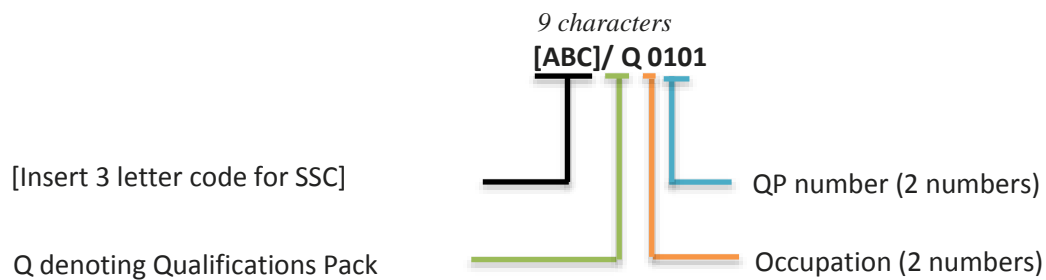
[Back to top...](#)



Annexure

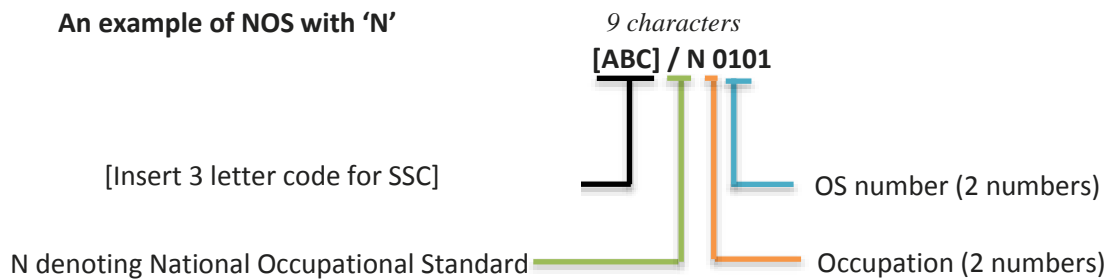
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



[Back to top...](#)



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

Sub sectors	Range of occupation numbers
Defence Equipment - Land & Naval Systems	01-30
Ship building & Ship breaking	31-60
Electronic Security Equipment Manufacturing	61-75
Safety & Fire Fighting Equipment	76-90
Common	91-94

Sequence	Description	Example
Three letters	Industry name	SMC
Slash	/	/
Next letter	Whether QP or NOS	Q or N
Next two numbers	Occupation code	1
Next two numbers	OS number	1

Note :

- The range of occupation numbers have been decided based on the number of existing and future occupations in a segment



CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role: Design Engineer Hull & Structures

Qualification Pack: SMC/Q 3301

Sector Skill Council: Strategic Manufacturing Sector Skill Council

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. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack , every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
SMC/N 3301 Planning for design of ship structures	PC1. perform basic calculations and collate the design data from various sources	100	7	2	5
	PC2. analyse the various ship systems and their general arrangement/location		7	2	5
	PC3. analyse the specific tasks applicable to assessment of design requirements in different phase of ship design		7	2	5



Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
	PC4. submit work measurement record, progress and output PERT charts		7	2	5
	PC5. incorporate readings to refine design of follow on vessels		7	2	5
	PC6. provide technical and logistics documentation relative to recommended design and performance requirements		7	2	5
	PC7. operate 2D/3D software and drafting workstations to make 2D/3D layout of Ship Hull and Structure design		7	2	5
	PC8. study existing hull and structural drawings of the vessel		7	2	5
	PC9. analyse design proposals and specifications to establish basic characteristics of a hull such as size, weight and speed		7	2	5
	PC10. prepare for the design activities of hull		7	2	5
	PC11. perform basic design verification and modifications		7	2	5
	PC12. develop basic sectional and waterline curves of the hull and structure to establish the centre of gravity, ideal hull and structure form, and data on buoyancy and stability		7	2	5



Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
	PC13. plan for mechanical and electrical design principles to support engineering, production, test and integration for various shipboard Hull & Structure		8	3	5
	PC14. integration of various components of Hull & Structure on drawing board		8	3	5
		Total	100	30	70
SMC/N 3302 Formulate design of hull and structures	PC1. formulate software designs in support of shipboard Hull such as auxiliary equipment designs, hull conditions,	100	10	3	7
	PC2. design the layout of ships' interiors including cargo space and ladder wells		10	3	7
	PC3. support in review specifications that relate to Hull Design		10	3	7
	PC4. support in technical manuals and other technical documentation that relate to Hull Design		10	3	7
	PC5. take and maintain records from the quality team on conducted hull surveys		10	3	7
	PC6. formulate software designs in support of mechanical and electrical systems such as machinery controller designs, deck crane systems, habitability spaces and other shipboard spaces		10	3	7



Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
	PC7. design the layout of ship's interiors including passenger compartments and elevators		10	3	7
	PC8. draft marks, plimsoll marks, load line marks at the final dimension stage		10	3	7
	PC9. take and maintain records from the quality team on conducted welding inspection, strength tests and material tensile tests		10	3	7
	PC10. verify the drawings and carry out requisite modifications		10	3	7
		Total	100	30	70
SMC/N 9103 Work effectively in a collaborative environment	PC1. define own work and responsibilities	100	6	2	4
	PC2. understand organisational, individual and team goals		6	2	4
	PC3. understand work requirements and assigned targets		6	2	4
	PC4. identify team members and other persons responsible for preceding and successive activities		6	2	4
	PC5. identify any problems with team members and take initiative to solve problems in a positive manner		6	2	4
	PC6. carry out any commitments made to others		6	2	4
	PC7. work together as a single unit to ensure efficiency in work		6	2	4



Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
	PC8. ensure proper care is given to a fellow worker in case of an accident		6	2	4
	PC9. give feedback of work done and report problems identified in the field		6	2	4
	PC10. communicate with other people clearly and effectively		6	2	4
	PC11. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		5	2	3
	PC12. exhibit proper work etiquettes		5	2	3
	PC13. display active listening skills while interacting with others at work and receiving feedback		5	1	4
	PC14. demonstrate responsible and disciplined behavior		5	1	4
	PC15. develop understanding, goodwill and trust with team members		5	1	4
	PC16. resolve individual disagreements with the concerned person		5	1	4
	PC17. recognize when a conflict situation exists and try to resolve amicably		5	1	4
	PC18. follow the organisation's policies and procedures to resolve conflicts		5	1	4
		Total	100	30	70



Compulsory NOS Total Marks: 400				Marks Allocation	
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills/ Practical
SMC/N 9104 Maintain a healthy, safe and secure working environment	PC1. maintain cleanliness and hygiene	100	3	1	2
	PC2. wear clean clothing		3	1	2
	PC3. follow health procedures		5	2	3
	PC4. identify common health hazards		5	2	3
	PC5. keep a look out for hazards		3	1	2
	PC6. use protective clothing/equipment		3	1	2
	PC7. keep a lookout for accommodation for safety		5	2	3
	PC8. keep a lookout for the Machinery		5	2	3
	PC9. keep a lookout for the Deck		5	2	3
	PC10. report any accidents or near accidents quickly and accurately to the proper person		4	2	2
	PC11. practice emergency procedures		5	2	3
	PC12. retrieve and/or point out documents that refer to safety at workplace		3	1	2
	PC13. use appropriate fire extinguishers on different types of fires correctly causes of fires		5	2	3
	PC14. ensure all portable fire extinguishers & stowage locations numbered, in place & inspection dated and for safety reasons, fire station not locked but only sealed		5	2	3
	PC15. demonstrate rescue techniques		5	2	3



	applied during fire hazard			
	PC16. demonstrate the correct use of a fire extinguisher	5	2	3
	PC17. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments	4	1	3
	PC18. participate in emergency procedures and move injured people and others in correct method during an emergency	5	2	3
	PC19. perform emergency procedures	5	2	3
	PC20. perform and organize loss minimization or rescue activity during an accident in real or simulated environments administer basic first aid to victims	4	1	3
	PC21. demonstrate how to free a person from electrocution, as per laid down procedure	5	1	4
	PC22. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.	5	1	4
	PC23. demonstrate basic techniques of bandaging	3	1	2
	Total	100	36	64