Model Curriculum

QP Name: Pipeline Maintenance Technician (Mechanical)

QP Code: HYC/Q6402

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 2.0

Hydrocarbon Sector Skill Council
OIDB Bhawan, Block G+3, 2nd Floor, Plot No.2, Vikas Marg,
Sector – 73, Noida, Uttar Pradesh -201301

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Training Parameters

Sector	Hydrocarbon
Sub-Sector	Downstream
Occupation	Pipeline Maintenance Technician (Mechanical)
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO/2015-3115.9900
Minimum Educational Qualification and Experience	10th Grade pass with 2-years relevant experience OR 12th Grade Pass OR 8th Grade pass plus 2-years of NTC plus 1-year NAC OR 10th Grade Pass plus 2-year of National Trade Cetificate (NTC) in relevant field OR Completed 2nd year of the 3-year Diploma (after 10th) in relevant field and pursuing regular Diploma
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	17-11-2022
Next Review Date	
NSQC Approval Date	3 years from date of Approval
QP Version	2.0
Model Curriculum Creation Date	
Model Curriculum Valid Up to Date	
Model Curriculum Version	2.0
Minimum Duration of the Course	-
Maximum Duration of the Course	660 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Check the equipment and machines installed in oil and gas pipeline facility to identify the defect/damage and plan for the repair and maintenance of the identified defect
- Carry out installation, repair, maintenance and testing of equipment in oil & gas pipeline
- Follow safety procedure during emergency/accident
- Work effectively with colleagues, superiors, members of own work group, people in other work groups within or outside the organization

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the Qualification Pack.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	Total Duration
BRIDGE MODULE	**06:00**	**Nil**	**Nil**	**06:00**
Module 1: Introduction to Hydrocarbon sector and the job role of Pipeline Maintenance Technician (Mechanical)	06:00	Nil	**Nil**	06:00
HYC/N6402 Prepare for repair and maintenance activities of the equipment ***NOS Version* – 2.0** **NSQF Level – 4**	**54:00**	**120:00**	**15:00**	**189:00**
Module 2: Prepare for repair and maintenance activities of the equipment	54:00	120:00	15:00	189:00
HYC/N 6403 Carryout repair, maintenance and testing of equipment in oil and gas pipeline **NOS Version No. – 2.0** **NSQF Level – 4**	**90:00**	**180:00**	**15:00**	**285:00**
Module 3: Carryout repair, maintenance and testing of equipment in oil and gas pipeline	90:00	180:00	15:00	285:00
HYC/N 9301 – Work effectively in a team **NOS Version No. – 3.0** **NSQF Level – 4**	**15:00**	**45:00**	**00:00**	**60:00**
Module 4: Effective working in a team	15:00	45:00	00:00	60:00
HYC/N 9302 – Maintain Health Safety and Security procedures **NOS Version No. – 3.0** **NSQF Level – 4**	**15:00**	**45:00**	**00:00**	**60:00**
Module 5: Health, safety and security	15:00	45:00	00:00	60:00
DGT/VSQ/N0102 - Employability Skills **NOS Version No. – 1.0**	**-**	**-**	**-**	**60:00**
Total Duration	**180:00**	**390:00**	**30:00**	**660:00**

Module Details

Module 1: Introduction to Hydrocarbon Sector and the job role of Pipeline Maintenance Technician (Mechanical)

Bridge Module

Terminal Outcomes:

- Discuss the Hydrocarbon Sector
- Discuss the job of a Pipeline Maintenance Technician (Mechanical)

Duration: 06:00	**Duration**: 00:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the oil and natural gas sector and its subsectors. • Explain the importance of a Pipeline Maintenance Technician (Mechanical) • Explain the roles and responsibilities of Pipeline Maintenance Technician (Mechanical)	
Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
• PPE Kit, pipe dies, power threading and cutting machines, hammers, chisels, wrenches	

Module 2: Prepare for repair and maintenance activities of the equipment Mapped *to HYC/ N6402 v 2.0*

Terminal Outcomes:

- Check the Equipment and machines.
- Planning for the repair and maintenance procedure

Duration: 54:00	**Duration**: 120:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the properties of crude oil and natural gas • Describe the crude oil and natural gas handling, processing and transportation • Describe various types of pipelines used for oil and gas transportation • Identify the various rotating and stationary equipment and machines i.e., engines, pump, compressor, boosters, generator, fuel filter, valves crane, bearing, injectors, engine governors, gaskets, piston rings etc installed in oil and gas pipeline facility • Define the function of equipment and machines used in oil & gas pipeline facilities • Describe the work permit system for repair and maintenance work in oil and gas pipeline facility	• Describe the properties of crude oil and natural gas • Describe the crude oil and natural gas handling, processing and transportation • Describe various types of pipelines used for oil and gas transportation • Identify the various rotating and stationary equipment and machines i.e. engines, pump, compressor, boosters, generator, fuel filter, valves crane, bearing, injectors, engine governors, gaskets, piston rings etc installed in oil and gas pipeline facility • Define the function of equipment and machines used in oil & gas pipeline facilities • Describe the work permit system for repair and maintenance work in oil and gas pipeline facility • Demonstrate how to check the health of various rotating and stationary equipment in the oil and gas pipeline equipment as per their safety and technical standards • Demonstrate how to check the utilities such as steam, nitrogen and air system for any leakage and the required pressure • Demonstrate how to carry out the solo run of the equipment and machine to identify the damage or defect • Describe how to record and compare the standard data • Define the types of damage or defects in oil and gas pipeline equipment and their possible solutions • Recall maintenance manual of machine and equipment associate with oil and gas pipeline for repair and maintenance • Follow instructions of site

	engineer//supervisor/ in charge • List tools, equipment and consumables required for repair & maintenance of pipeline • Describe how to maintain the record of health status/ data of all machines and equipment

Classroom Aids:

- White / Black board and Projector
- Digital Presentation
- Computer/Laptop
- Public Addressing System

Tools, Equipment and Other Requirements

- Snips and shears
- Hacksaws
- Chisels
- Grades and files
- Open-end wrenches
- Spanner
- Allen key
- Vernier calliper
- Micrometre
- Adjustable wrenches
- Pliers
- Hammers
- Punches
- Taps and dies
- Drills
- Grinders
- Screw driver
- Spirit level
- Anvil
- Leak detector
- Motor
- Pumps
- Drilling machine – Bench
- Grinding machine – Bench
- Bearing puller
- Machine/ equipment manuals
- Twist drill bit

Module 3: Carryout repair, maintenance and testing of equipment in oil and gas pipeline

Mapped to HYC/N6403 v 2.0

Terminal Outcomes:

- Carry out repair and preventive maintenance
- Testing of equipment and machines after repair

Duration: 90:00	**Duration**: 180:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the repair, replacement and installation methods • Plan, organise and priorities assigned repair and maintenance activities • Use tools, equipment appropriately for dismantling, repair, replacement, assemble and testing • Follow the steps mentioned in the maintenance manual for repair and maintenance the damaged equipment	• Describe the repair, replacement and installation methods • Plan, organise and priorities assigned repair and maintenance activities • Use tools, equipment appropriately for dismantling, repair, replacement, assemble and testing • Follow the steps mentioned in the maintenance manual for repair and maintenance the damaged equipment • Demonstrate the procedure for isolating the damaged part/equipment from the coupling • Demonstrate how to install the new equipment as per the requirement • Demonstrate the procedure to reassemble the parts of the machines and equipment after repair • Demonstrate how to adjust the repaired machine to its original condition as per the specifications • Demonstrate how to check the equipment/machine for proper fitting, any abnormal vibration and overheating • Demonstrate how to perform the solo run of machine/equipment for any abnormalities on repaired/replaced items • Describe the 5S activities post-repair and maintenance • Demonstrate the testing procedures of the repaired and maintenance equipment and machine • Describe how to prepare the repair and maintenance report and its submission to the supervisor//site engineer
Classroom Aids:	
• White / Black board and Projector • Digital Presentation	

• Computer/Laptop • Public Addressing System
Tools, Equipment and Other Requirements
• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit

Module 4: Effective working in a team

Mapped to HYC/N9301 v 3.0

Terminal Outcomes:

- Describe how to interact with others effectively and appropriately.
- Demonstrate how to deal with colleagues at workplace

Duration: 15:00	Duration: 45:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe methods to communicate clearly with the supervisor and reporting authorities. • Explain how to share information in line with organisational requirements. • Explain the organisation's policies and procedures. • Explain how to identify causes of interpersonal conflict at workplace. • Describe ways/methods to resolve interpersonal conflict. • Explain the importance of gender equality. • Explain the importance of supporting and respecting colleagues and other members of the organisation without any bias based on gender, culture, disability etc. • Explain the importance of gender neutral behaviour while interacting with others.	• Demonstrate ways to handle interpersonal conflict at the workplace. • Demonstrate the ways of developing suitable rapport with other team members. • Demonstrate how to respond during emergencies. • Demonstrate how to communicate in a manner that is respectful of gender, culture and disability.
• Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
• Dummy team	

Module 5: Health, safety and security

Mapped to HYC/N9302 v 3.0

Terminal Outcomes:

- Identify the possible cause of accident and hazards
- Explain how to maintain safety and healthy environment
- Demonstrate how to use PPE kit at workplace

Duration: 15:00	**Duration**: 45:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain importance of using PPE like face mask, hand gloves, goggle, protective clothing/equipment, etc. at workplace. • Explain how to monitor the health and safety of self and other team members. • Explain the hazard and risk associated with mishandling various tools and equipment. • Discuss safe work practices as per the company's guidelines and procedures. • Explain the good housekeeping practices to prevent any hazard. • Explain how to record and report all incidents, damages or injury. • Explain importance of personal and workplace hygiene.	• Demonstrate how to appropriately wear and discard PPE kit. • Demonstrate how to respond promptly and appropriately to an accident. • Demonstrate how to administer first aid. • Demonstrate various rescue techniques. • Demonstrate how to use fire extinguishers. • Show the correct way to lift heavy objects.
Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
• First aid kit • Dummy for first aid treatment • Housekeeping kit • Personal Protective Equipment (PPE)	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma in Mechanical Engineering/ Petroleum Engineering	-	2	-	1	-	• Minimum 2 years of industry experience in relevant job role and a • Minimum of 1 years Training experience in relevant job role

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Pipeline Maintenance Technician (Mechanical)" mapped to QP: "HYC/Q6402". Minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q2601". Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma in Mechanical Engineering/ Petroleum Engineering	-	2	-	1	-	• Minimum 2 years of industry experience in relevant job role and a • Minimum of 1 years Training experience in relevant job role

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Pipeline Maintenance Technician (Mechanical)" mapped to QP: "HYC/Q6402". Minimum accepted score is 80%	Recommended that the Assesor is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q2601". Minimum accepted score is 80%.

Assessment Strategy

The assessment of candidates/trainees will be on the basis on assessment outcome/assessment criteria of the Qualification. In the assessment criteria for each NOS marks have been defined for theoretical and practical skills, on which the candidate will be assessed. The emphasis is on 'learning-by-doing' and performance criteria is based on the practical demonstration of skills and knowledge.

Theory/Knowledge test– This section will test the trainee on his/her knowledge on the subject/trade. The test will be carried out online/offline with a set of random Question paper. that include multiple choice questions in multilingual, True/False Statement, audio-video question etc.

The Question Bank will be developed by Subject Matter Experts (SME) of the hydrocarbon sector and these questions again be vetted by the Industry Experts, each performance criteria have its marks for theory based on the level of question i.e., easy, medium and difficult.

Practical/Demonstration Test– This stage involves the face-to-face interaction between Assessor and each trainee. The practical knowledge will be tested through trade test which demonstrates the skill required for the job, by which assessor would be able to evaluate the trainee for his/her practical knowledge on respective Qualification.

To ensure the maximum possible consistency in the assessment by different assessors at different locations, orientation of the assessors is also required about the stages involved in the assessment and the assessor role in the assessment process. The assessor must have knowledge of the following concepts before assessment:

- Qualification Pack Structure
- Guidance for the assessor to conduct theory and practical assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist
- Practical/Demonstration Test guidance for uniformity and consistency.
- Guidance on assessment evidence collection (signed attendance copy, verification of the authenticity of the candidate by checking the photo ID card, Photographs-while assessment undergoing etc.)

The empaneled assessment agencies will be instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document with its assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to ideally have assessor with sufficient amount of relevant industry experience related to Qualification. The assessors will also have scrutinized and have to undergo orientation of assessment framework, competency-based assessments etc.

Recognition of Prior Learning (RPL)

Under the Recognition of Prior Learning (RPL), the candidates enrolled and the assessment will be carried out as per the assessment criteria and assessment outcome of the full Qualification and the process of assessment will be carry out by the body/bodies empaneled by Hydrocarbon Sector Skill Council

In RPL, the candidate already has the skills and knowledge while working on the job from long, the learners only require to undergo a brief orientation training and the subsequent assessment process and

certification is awarded to those candidates who successfully clears the assessment. The tentative process of RPL would include the flowing stages:

1 Cluster Mapping and Mobilization of the candidates
2 Counselling & Pre-Screening
4 Candidate registration, batch creation and enrolment
5 Conductions of an orientation program for candidates before assessment
7 Assessment by HSSC
8 Evaluation of Assessment Result
9 Issuance of the Certificate to successful candidates

Assessment Strategy:

- For each Qualification Pack assessment criteria has been developed, which describe the weightage for each NOS/Performance criteria (PC) and assigned marks based on each NOS separately for theoretical and practical skills
- The question bank will be developed by the subject matter experts to assess the theoretical and practical knowledge.
- The accredited assessment agency will carry out the assessment process on the date proposed after completion of the training. The assessment will be carried out on the basis of the two parameters i.e., Theoretical test and Practical test.
- The result of the assessment will be shared by assessment body to the HSSC for review and compliance, after that result will be processed and certificates will be generated
- Assessments shall be conducted in the regional languages in case of any specific requirement from the concerned Training Provider.
- For ensuring the impartial assessment it will be ensured that the Assessment Bodies (AB) are not involved in any type of training delivery with respect to this project.

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the 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 the 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 these criteria.
6. To pass the Qualification Pack assessment, 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.

Recommended Pass % aggregate for QP: 70%

References

Glossary

Term	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 set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an 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 (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements that together specify the technical, generic, professional and organizational specific knowledge that an individual need 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.
Core Skills/Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. In the context of the OS, these include communication-related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

Acronyms and Abbreviations

Term	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
OS	Occupational Standard(s)
QP	Qualifications Pack
KU	Knowledge and understanding
GS	Generic Skills
FAQ	Frequently Asked Questions
BP	Business Partner
KYC	Know Your Consumer
FAB	Feature Advantage Benefit