MINISTRY OF HUMAN RESOURCES

HRD CORP
HUMAN RESOURCE DEVELOPMENT CORPORATION

IndSF Oil, Gas & Energy

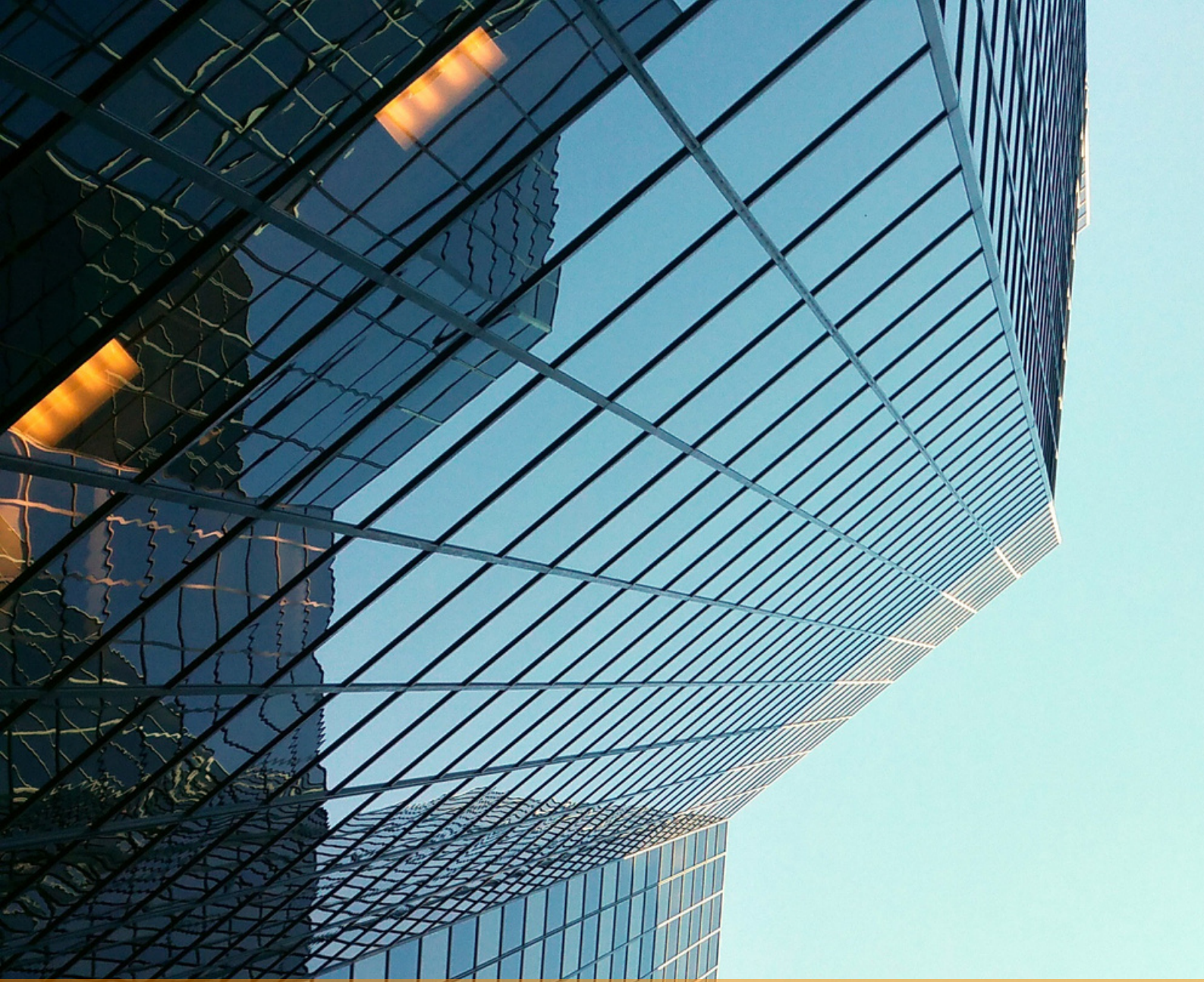
2ND EDITION

IN COLLABORATION WITH

PETRONAS

MOGSC
MALAYSIAN OIL, GAS & ENERGY SERVICES COUNCIL

2022



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PREFACE

The oil, gas and energy industry in Malaysia is a fast-growing industry and has a significant contribution to the national economy. Thus, the first version of the Industrial Skills Framework for Oil, Gas and Energy has been developed in 2019 with key industry players and employer associations to address talent development needs within the respective industry. HRD Corp recognised the importance of enhancing the IndSF document for this industry in 2022 to increase the number of focus areas covered and enrich the information on current talent development skill sets required. HRD Corp through its collaborators, PETRONAS Berhad and the Malaysian Oil, Gas and Energy Services Council (MOGSC) have identified critical focus areas to be enhanced and Subject Matter Experts (SMEs) that will be involved in the initiative. Workshop sessions were conducted both physically and online. The enhancement of IndSF Oil, Gas and Energy focuses on various skill sets as listed below:

- Welding Inspection (for Plant Maintenance, Turnaround and Project Works)
- Hydro-Jetting (for Turnaround)
- Insulation (for Plant Maintenance, Turnaround and Project Works)
- Blasting & Painting (Blaster) (for Plant Maintenance, Turnaround and Project Works)
- Blasting & Painting (Painter) (for Plant Maintenance, Turnaround and Project Works)
- Coating Inspection (for Plant Maintenance, Turnaround and Project Works)
- Thermal Spray Coating (for Plant Maintenance, Turnaround and Project Works)
- Corrosion Monitoring (for Plant Maintenance, Turnaround and Project Works)
- Rotating Equipment Vibration Monitoring (for Plant Maintenance)
- Flange Management (for Plant Maintenance, Turnaround and Project Works)
- Cathodic Protection (CP) Monitoring (for Plant Maintenance, Turnaround and Project Works)

ACKNOWLEDGEMENT

Special thanks to Corporate Projects, Group Procurement, PETRONAS Project Delivery and Technology, and the Malaysian Oil, Gas and Energy Services Council (MOGSC) for being the key driver in bringing the industry players together towards the production of this framework, an industry initiative by HRD Corp, PETRONAS and MOGSC to enhance the competitiveness of the OGSE industry.

We would like to express our gratitude to all the Subject Matter Experts involved in the enhancement of Industrial Skills Framework (IndSF) Oil, Gas and Energy as follows:

1. Ir. Ts. Noor Hisham Bin Yahaya	MOGSC
2. Abang Mohd Faiz Bin Latip	MOGSC
3. Ts. Anwarudin Bin Saidu Mohamed	MOGSC
4. Devinakumar A/L Ratanam	Topfields Borneo Sdn. Bhd.
5. Chan Wai Sing	Oilfield Offshore Services Sdn. Bhd.
6. Lau Hong Kit	Innocorr Offshore Sdn. Bhd.
7. Choo Siang Wen @ Cheok Siang Wen	Kebabangan Petroleum Operating Company Sdn. Bhd.
8. Ir. Mohd Syukri Mohd Khalid	Shell Malaysia
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10. Ng See Meng	PETRONAS Berhad
11. Ir. Alzakri Bin Ekhwan	PETRONAS Berhad
12. Safari Bin Saad	PETRONAS Berhad

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We would like to express our gratitude to all the Subject Matter Experts involved in the enhancement of Industrial Skills Framework (IndSF) Oil, Gas and Energy as follows:

13. Nurjaimi Binti Ali	PETRONAS Berhad
14. Ir. Mohd Aswadi Bin Ton Alias	PETRONAS Berhad
15. Ir. Mohd Nizam Bin Ab Wahab	PETRONAS Berhad
16. Ir. Abdul Latif @ Abd Rahman Bin Mohamed	PETRONAS Berhad
17. Ir. Abdul Razak Bin Abdul Rahman	PETRONAS Berhad
18. Mas Arman Bin Sugindi	PETRONAS Berhad
19. Wan Abdullah Bin Wan Hamat	PETRONAS Berhad
20. Koay Tze How	PETRONAS Berhad
21. Faizul Bin Idris	ROCKWOOL Malaysia Sdn. Bhd.
22. Muhammad Haidar Bin Md Yazid	PETRONAS Berhad
23. Ahmad Badruddin Bin Amin	PETRONAS Berhad
24. Yip Han Wei	Sarawak Shell Berhad

FOREWORD

YBHG. DATUK SHAHUL DAWOOD

Chief Executive, HRD Corp

HRD Corp has been working continuously to improve efficiency at the workplace. We do this by equipping the Malaysian workforce with proper skills, competencies, and training. Therefore, we strongly believe that a well-planned investment into human capital development will boost the growth of various industries and ultimately, the economy in the long term. This requires us to work together with industry players to understand the skill gaps in various industries and identify the most suitable training programmes for their talents. To that end, we have focused on higher-level technical competencies and certification programmes.

In order to deliver on our vision of enabling industry players to upskill and reskill their employees effectively, we also realise the need to revamp our approaches by providing them with the right information and opportunities.

As such, the Industrial Skills Framework (IndSF) is a well-timed effort that can support this aim. It maps out comprehensive information on different jobs and specialities, career pathways, required skills and development plans that can support individuals and businesses in attracting and nurturing the right talents.

I would like to take this opportunity to congratulate all the subject matter experts from their respective industries for their tireless effort in developing this IndSF document. I would also like to express my gratitude to all our collaborators who made this possible. It is indeed an honour to be able to deliver this initiative to the Malaysian workforce. HRD Corp looks forward to developing more IndSF documents across a broader range of industries in the years to come.

We also look forward to being the driving force for shaping and empowering our local human capital for decades to come.

FOREWORD

Head of Group Technical Specialist, PETRONAS Berhad

ISKANDAR BAKERI

Dear Readers,

I would like to thank the subject matter experts for their involvement and contributions in enhancing the Industrial Skills Framework (IndSF) for Oil, Gas & Energy that was developed in 2019. This effort would not have been possible without the undivided commitment and support given by all experts and collaborators involved.

Following the first edition of IndSF Oil, Gas & Energy, eleven (11) skill sets were enhanced under Maintenance, Turnaround and Projects for Onshore Facilities and Downstream Plants, which detailed information on the industry's current need in terms of core skills and competencies for the targeted IndSF audience.

I highly encourage readers to adapt to the input from IndSF and attend the recommended training programmes. We remain steadfast to ensure that the content of this document is relevant to the industry's current needs and the future of the oil, gas and energy sectors.

Allow me to express my gratitude to MOGSC, for reviewing the first edition and proposing 11 skill sets to be added to this revision. The proposed skill sets and competencies are part of the new certification system that the industry is pursuing to deliver better quality. Additional critical job positions in the industry have been successfully identified and added to this revision with the proposed enhancements.

I would like to also thank HRD Corp for its role in creating and facilitating this initiative. I hope that this second edition of this IndSF will serve as a guide and reference to enhance our productivity in meeting the industry's growing demand and challenges.

Thank you.

FOREWORD

TS. SYED SAGGAF SYED AHMAD

President, Malaysian Oil, Gas & Energy Services Council (MOGSC)

PETRONAS and the Malaysian Oil, Gas & Energy Services Council (MOGSC) were the co-lead for the first edition of the Industrial Skills Framework (IndSF) for Oil, Gas & Energy which was published on 17th March 2020, as an initiative by HRD Corp Malaysia.

Subsequently, it went through an enhancement process with an additional 11 skill sets developed or revised to complement the published first edition. This enhanced second edition involved 24 Subject Matter Experts (SMEs) proposed by PETRONAS and MOGSC. A series of workshop sessions were conducted with the SMEs to collect the required information from July until September 2022.

The objective of IndSF is to identify skills and competency requirements of the industry through stakeholder engagement and the development of the Industrial Skills Framework. This document will serve the needs of individuals within the industry on their career development, employers to have a proper framework for talent development, and also training providers to enable a demand-driven training ecosystem.

MOGSC is pleased to have once again collaborated with PETRONAS and HRD Corp in developing this IndSF to raise the competency and capability of the workforce for the benefit of the industry. We would like to express our appreciation to HRD Corp for your guidance, PETRONAS for your support and SMEs for your expertise and industry experience in developing the IndSF. We hope that this document will be a beneficial tool for existing and future talents, employers and training providers in achieving a highly skilled workforce nation.

Guidelines

GUIDELINE 01

This document serves as a GUIDE for individuals, employers and training providers on knowledge, experiences and skills mastery in the Oil, Gas and Energy industry.

GUIDELINE 02

The job matrix serves as a REFERENCE for career progression within the industry.

GUIDELINE 03

The Industrial Skills Framework for Oil, Gas and Energy will FOCUS ON Level 4 of the Malaysian Skill Certification (or its equivalent) and above.

GUIDELINE 04

This document focuses on JOB DESCRIPTIONS, SKILLS AND TRAINING NEEDED in the Oil, Gas and Energy industry.

GUIDELINE 05

It is a COMPLEMENTARY DOCUMENT to existing references developed by the National Occupational Skills Standard (NOSS) and Malaysian Qualifications Framework (MQF).

GUIDELINE 06

The Industrial Skills Framework document is NOT EXHAUSTIVE and may be REVIEWED FROM TIME TO TIME for continuous improvements in parallel with the latest changes within the industry.

About HRD Corp - IndSF

HUMAN RESOURCE DEVELOPMENT CORPORATION (HRD CORP)

- It acts as an ADVISORY TO EMPLOYERS in identifying suitable training programmes that meet the emerging needs of their business while bringing a positive impact to the industry.
- It drives measurable effect(s) to the business and ensures the highest value and return on training investment for the employers and employees based on the changing needs of future work environment.

INDUSTRIAL SKILLS FRAMEWORK

HRD Corp Industrial Skills Framework (HRD Corp-IndSF) is developed by HRD Corp to support the industry in acquiring a skilled workforce according to the types and levels of competencies needed by the industry.

About HRD Corp - IndSF

Principles

Meet the **COMPETENCY REQUIREMENT** of sectors currently covered under PSMB Act 2001

Accommodate the **NEEDS** of in-service workers

Built upon the **NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS)**

Focus mainly on **LEVEL 4 MALAYSIAN SKILL CERTIFICATION** or its equivalent and above

Developed together with the industry and benchmarked against successful **FRAMEWORK MODEL(S)**

HRD CORP - IndSF ASPIRATION

MORE INDUSTRY-RELEVANT training content

GREATER UTILISATION of levy

BETTER TRAINING OUTCOMES through a collaborative approach

FOR INDUSTRY: To identify emerging industry requirements in order to equip the existing workforce with the right knowledge and skills and find suitable interventions to bridge the needs by leveraging on existing resources.

SECTORIAL INFORMATION

Business Outlook

Total Number of Registered Employers

2154

Total Number of Employees

180,037

Total Levy Collection (RM)

40.3 million

Total Levy Claimed (RM)

15.8 million

% Levy Utilisation

39.2

Financial Assistance Approved (RM)

25.4 million

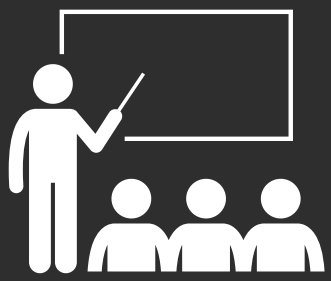
(Source: HRD Corp Internal Data, Jan. 2022 - July 2022)

SECTORIAL INFORMATION

Business Outlook

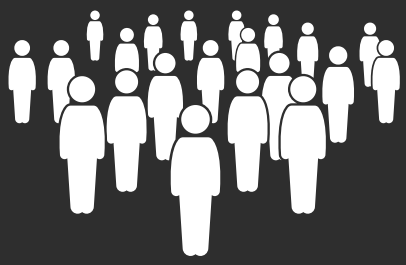
Training Places Approved

20,260



Trainees Trained

14,145



% of Professional Training Attended

47.7

(Source: HRD Corp Internal Data, Jan. 2022 - July 2022)

SECTORIAL INFORMATION

Business Outlook

- Advanced Turnaround Shutdown and Outage Management
- TUV/IICS 3.1- Welding Inspector & API577 Welding Inspection & Metallurgy
- Coating Inspector Programme Level 2
- Strategic Mercury Management: Handling, Removal and Control in the Oil & Gas Industry
- CSWIP Visual Welding Inspector Level 1 (WIS1)
- LV Switchgear Maintenance

Top Courses

- Maintenance and Reliability Best Practices
- Total Productive Maintenance: Concept and Principles
- Chilled Water System Maintenance
- Plant Maintenance - Preventive Maintenance Training
- Authorised Gas Tester & Entry Supervisor (AGTES)
- Basic Occupational First Aid, CPR and AED

SECTORIAL INFORMATION

Business Outlook

Moving Forward

EMPLOYERS

- **Refer** to the Skills Framework to find out about employees' skills standards.
- **Identify** relevant or required training courses and succession plans for employees based on occupation.
- **Plan** the training sessions for employees for their career advancement.

CURRENT EMPLOYEES

- **Refer** to the Skills Framework to find out how to chart their career.
- **Identify** skill gaps in the current job role to upskill or reskill.
- **Plan** their career progression.

FUTURE TALENTS

- **Refer** to the Skills Framework to find out about careers in the sector.
- **Identify** job opportunities in the sector along with career pathway attributes based on the occupation.
- **Understand** the skills required to perform the job and identify relevant training for professional self-development.

Identify Relevant Training Courses

Training Courses

EMBARKING ON A CAREER

- Courses that equip future talents with relevant knowledge.

LIFELONG LEARNING TO FULFILL EXISTING AND EMERGING DEMANDS OF THE INDUSTRY

- Courses that will upskill or reskill current employees.

List of New and Enhanced Skillsets

The Industrial Skills Framework (IndSF) Oil, Gas and Energy developed in 2019 has been reviewed by the collaborators and was proposed for enhancements. The existing occupational competencies have been enhanced and a new addition, as well as certification schemes, have been added to this revision. With the proposed enhancement, there are 11 skill sets involved:

1. Welding Inspection (for Plant Maintenance, Turnaround and Project Works)
2. Hydro-Jetting (for Turnaround)
3. Insulation (for Plant Maintenance, Turnaround and Project Works)
4. Blasting & Painting (Blaster) (for Plant Maintenance, Turnaround and Project Works)
5. Blasting & Painting(Painter) (for Plant Maintenance, Turnaround and Project Works)
6. Coating Inspection (for Plant Maintenance, Turnaround and Project Works)
7. Thermal Spray Coating (for Plant Maintenance, Turnaround and Project Works)
8. Corrosion Monitoring (for Plant Maintenance, Turnaround and Project Works)
9. Rotating Equipment Vibration Monitoring (for Plant Maintenance)
10. Flange Management (for Plant Maintenance, Turnaround and Project Works)
11. Cathodic Protection (CP) Monitoring (for Plant Maintenance, Turnaround and Project Works)

Kindly access the First Edition of IndSF Oil, Gas and Energy 2019 via https://hrdcorp.gov.my/indsf/oil-gas-energy/ for reference.

TECHNICAL SKILLS AND COMPETENCIES

Glossary

1. **Oil & Gas Downstream**

The Oil & Gas industry is usually divided into three (3) major sectors; upstream, midstream and downstream. The downstream sector is the refining of petroleum crude oil and the processing and purifying of raw natural gas until products are produced in a refinery or a petrochemical plant. These products are then distributed through a network of oil terminals to be marketed to the consumers. The common consumer products produced from the downstream sectors are LPG, petrol, jet fuel, diesel, fuel oil and many other petrochemical products such as lubricants and plastic-based products.

2. Plant Maintenance

Plant maintenance is a set of activities which are necessary to keep equipment, parts or components of machinery, or an entire system, in good operating conditions to avoid production stoppage and loss. Maintenance activities are to produce plant availability and reliability; increasing the operational efficiency of plant facilities and thus contributing towards revenue by reducing the operating costs and increasing the effectiveness of production. It is the action taken to prevent plant and equipment from failing and to repair normal degradation experienced in the operation and to keep it fit for operation.

3. Plant Turnaround

Plant turnaround is the scheduled maintenance or replacement work of an entire process unit of a plant such as a refinery or a petrochemical plant; taken off-stream for an extended period for inspection, cleaning, repair or replacement activities to keep the plant reliable. During this turnaround, statutory inspection normally takes place in order to extend the certificate of fitness of the equipment.

4. Project Works

Project work is the temporary, unique and progressive work activities to produce a tangible result (a unique product). It usually includes a series of interrelated tasks that are planned for execution over a fixed period and within certain requirements and limitations such as cost, quality, safety and schedule.

PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS

TSC CATEGORY	1.1.1 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	**WELDING INSPECTION**				
TSC DESCRIPTION	Welding inspection describes the activities of carrying out welding quality checks and monitoring code compliance and workmanship control.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	LEVEL 2	**LEVEL 3**	**LEVEL 4**	**LEVEL 5**
			Welding Inspector	**Welding Supervisor**	**Welding Specialist**

KNOWLEDGE			• Welding quality control
			• Welding Qualification Test (WQT)
			• Welding Procedure Specification (WPS)
			• Procedure Qualification Record (PQR)
			• Types of common welding defects which include but are not limited to:
			  • Cracks
			  • Lack of fusion
			  • Lack of penetration
			  • Undercut
			  • Porosity
			  • Slag inclusion
			• Types of common Non-Destructive Testing (NDT) for welding which include:
			  • Ultrasonic Testing (UT)
			  • Radiographic Testing (RT)
			  • Magnetic Particle Testing (MT)
			  • Visual Testing (VT)
			  • Dye Penetrant Testing (PT)
				• Codes and standards
				  • AWS D1.1
				  • ASME IX
				  • API 1104
				• Welding processes
				  • Shielded Metal Arc Welding (SMAW)
				  • Gas Tungsten Arc Welding (GTAW)
				  • Flux Core Arc Welding (FCAW)
				  • Submerged Arc Welding (SAW)
				• Welding and welder qualification
				• Hazards identification pre- and post-welding
				• Welding Key Performance Indicator
				  • Weld repair rate
				  • Welding progress
				  • Safety performance
				• Materials of construction
				  • AWS Group I, II, III and IV
				  • ASME IX (P-No.)
				  • API 1104
					• Welding Procedures Specification (WPS)
					  • Essential variables
					  • Non-Essential variables
					• Mechanical testing
					  • Tensile test
					  • Charpy test
					  • Bend test
					  • Crack Tip Open Displacement (CTOD)
					  • Macro examination
					• Non-Destructive Testing (NDT) which includes:
					  • Ultrasonic Testing (UT)
					  • Radiographic Testing (RT)
					  • Magnetic Particle Testing (MT)
					  • Visual Testing (VT)
					  • Dye Penetrant Testing (PT)
					• Welder Qualification Test (WQT)
					  • Essential variables
					  • Non-Essential variables
					• Technical writing skill
					• People management skill
					• Interpersonal skill
					• Communications skill

ABILITIES			• Inspect welding quality
			  • Weld discontinuity and defects
			  • Misalignment
			  • WPS compliance check
			• Check safety performance
				• Arrange the overall welding site
				• Organise welding tools, required consumables, personal, and construction materials
					• Prepare or develop Welding Procedure Specifications (WPS)
					• Inspect specimen mechanical testing

TSC CATEGORY	1.1.2 PLANT TURNAROUND				
TSC	**HYDRO-JETTING**				
TSC DESCRIPTION	Hydro-jetting describes the activities of blast cleaning water at high pressure into small-bore pipes or tubes, particularly heat-exchanger tubes; both internally and externally. At times, hydro-jetting activities also involves metal cutting, especially in the presence of hydrocarbon.				
TSC PROFICIENCY DESCRIPTION	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**	LEVEL 5
	Hydro-Jetting Assistant	**Hydro-Jetting Operator**	**Hydro-Jetting Senior Operator**	**Hydro-Jetting Supervisor**	

KNOWLEDGE	• Safe work practices
	• Working at a height
	  • Working in a confined space
	  • Housekeeping at the workplace
	• Proper usage of PPE
	• Basic knowledge of water jet machine:
	  • Types of water jet machines
	  • Hook up and assembly
	  • Awareness of 3R concept
		• Safekeeping, checking, testing, and proper usage of PPE
		• Types of water jet machines:
		  • Manual
		  • Semi-auto
		  • Auto
		• Type of pumps and limitations on their applications
		• Safe operating procedures for hydro-jetting activities
			• Application and limitation of semi-auto / auto hydro jet machine for cleaning and metal cutting
			• Basic troubleshooting of 'stubborn' sludge/scale
			• Application of degreaser
				• Supervise and manage teams for hydro-jetting activities
				• Maintenance and troubleshooting of the water jet machine
				• Basic scheduled waste management	

ABILITIES	• Take safety precautions around the work area
	• Adhere to safety procedures
	• Identify unsafe conditions at the workplace
	• Assist on hook up and assembleof water jet components, accessories and machine
	• Assist to differentiate the types of hose, lancing, pump and water jet accessories
	• Identify issues of equipment hook-up and assembly
		• Respond to unsafe conditions at the workplace
		• Hook up and assemble the water jet components, accessories and machine
		• Differentiate types of hose, lancing, pump and water jet accessories
		• Respond to issues of equipment hook-up and assembly
		• Interpret the scope of hydro-jetting deliverables
		• Inspect and use rigging aids such as block and tackle, and chain hoist
		• Operate high-pressure water jetting equipment
		• Carry out hydro-jetting cleaning in open space
		• Carry out hydro-jetting cleaning in a confined space
			• Monitor compliance with safe work procedures
			• Check for unsafe conditions surrounding the workplace
			• Monitor sustainability practices and wastage
			• Prepare a hydro-jetting plan
			• Verify the safety of hydro-jetting fittings such as lances, hoses, fittings and nozzles
			• Select the correct or suitable type of lances, hoses, fittings and nozzle as per the cleaning requirements
			• Select pumping rate to suit cleaning requirements
			• Carry out cleaning operation inspection to ensure safety and quality aspects of work delivery
			• Troubleshoot and resolve cleaning issue operations
				• Prepare work schedule and manpower assignment
				• Organise resources
				  • Cleaning tools and equipment
				  • Lifting tools and equipment
				  • Materials and consumables
				• Prepare management report
				• Liaise with the client on the scope of cleaning requirements
				• Liaise with client on inspection requirements:
				  • Pre-cleaning
				  • Post-cleaning
				• Report to the client on cleaning issues	

TSC CATEGORY	1.1.3 PLANT MAINTENANCE / PLANT TURNAROUND/ PROJECT WORKS				
TSC	INSULATION				
TSC DESCRIPTION	Insulation activities describe the installation process of insulation materials, jacketing and cladding for heat loss, heat gain or personnel protection.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	Insulation Assistant	Insulation Installer	Insulation Foreman	Insulation Supervisor	Insulation Inspector
KNOWLEDGE	• Insulation materials on site storage requirements • Safe work practices • Working at a height • Working in a confined space • Working under a suspended load • Housekeeping at the workplace • Proper usage of PPE	• Equipment type, component, and piping systems • Materials identification through labelling and/or certification logo • Types of insulation materials: • Stonewool • Cellular glass • Calcium silicate • Perlite • Vapour barrier and its applications • Types of jacketing • Aluminium • Galvanised zinc • Wire cage • Application of insulation • Hot insulation • Cold insulation • Personal protection • Handling and preservation of different types of insulation materials and jacketing • Basic use of installation tools • Installation limitation identification • Installation quality acceptance level • Installation area readiness • Corroded surface • Damage coating application • Corrosion Under Insulation (CUI)	• Hazard and safety compliance • Job Hazard Analysis (JHA) • Permit to Work (PTW) • Waste management • Identification of site/area/location of insulation installation drawings • Equipment layout • Piping plan • Isometric • Insulation, jacketing, and cladding rejection criteria and corrective action • Damaged • Dented • Sub-standard • Standard installation guidelines, procedure and acceptance criteria	• Hazard and risk assessment • Job Hazard Analysis (JHA) • Permit to Work (PTW) • Waste management • Identification of site/area/location of insulation installation drawings • Process Flow Diagram (PFD) • Piping Process & Instrumentation Diagram(P&ID) • Insulation design specifications • Thickness • Density • Thermal conductivity • Corrosion Under Insulation (CUI) prevention design • Rain shield designs • Drainage hole • Special coating • Quantify surface condition as per ISO 4628-3 (rust indicator) • CUI potential areas inspection	• Materials verification and traceability • Labelling • Certification logo • Inspection Test Plan (ITP) requirements • Specifications • Dimension • Thickness • Types of visual inspection defects • Application of inspection tools for defect measurements • Pit gauge • Feeler gauge • Types of coating systems for various environments and process services • Procedures of routine/specific insulation survey • Indicative condition leading to CUI

ABILITIES	• Organise proper temporary storage for material protection
	• Practice safe work and 5S
		• Identify materials as per specifications
		• Measure and cut insulation materials
		• Carry out pre-forming of insulation jacketing
		• Perform insulation installation:
		  • Piping
		  • Equipment
		  • Structures
		• Install jacketing locks, rain shields, cold application support and sealant
		• Remove and seal off damaged insulation and jacketing
		• Inspect readiness of installation area
		• Implement the 3R concept; Reduce, Reuse, Recycle
			• Monitor compliance to JMS, JHA, PTW
			• Lead toolbox meeting
			• Identify the site/area/location of insulation installation
			• Assess the readiness of the system/asset prior to insulation installation
			  • Heat tracing
			  • Welding
			  • Coating
			  • Corrosion
			• Identify useable existing insulation, jacketing and accessories
			• Dispose of insulation, jacketing and accessories as required
			• Advise rectification of improper insulation installation
				• Conduct JHA, identify risk and specify risk mitigation
				• Monitor adherence to safety procedures
				• Apply Permit to Work (PTW)
				• Confirm site/area/location of insulation installation
				• Advise methods for any installation obstacle
				• Specify a location for CUI inspection
				• Calculate the quantity of insulation and jacketing materials as per specifications
				• Advise insulation specifications based on design
				  • thickness
				  • density
				  • thermal conductivity
				• Manage proper disposal of insulation
				• Verify useable existing insulation, jacketing and accessories
				• Supervise execution as per Inspection Test Plan (ITP)
				• Prepare work schedule and manpower assignment
				• Monitor insulation project progress
				• Response to Emergency Response Plan (ERP)
				• Apply 3R concept; Reduce, Reuse, Recycle
					• Verify materials conformity to Certificate of Acceptance (COA)
					• Perform inspection based on ITP
					• Inspect and verify system/asset readiness for insulation work
					• Prepare Non-Conformance Report (NCR)
					
					• Propose site/area/location for CUI inspection
					• Prepare inspection report
					• Brief inspection findings and cause of damaged insulation

TSC CATEGORY	1.1.4 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	BLASTER				
TSC DESCRIPTION	Blasting describes the activities of surface preparation of steel and nonferrous to a specified standard in getting the substrate ready for painting; covering principles of surface preparation, surface cleanliness, surface profile, dust and debris control and abrasives.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	Blaster Assistant	Blaster	Blasting & Painting Foreman	Blasting & Painting Supervisor	Blasting & Painting Superintendent

KNOWLEDGE	• Surface preparations
	  • Objective
	  • Types/requirements
	• Hazards in blasting activities
	• Safe work practices:
	  • Rules and regulations
	  • Safety features of blasting equipment
	• Methods of surface preparation, the difference between those methods and the properties of each method
	• Set up and tear down abrasive blasting equipment, hoses and accessories
		• Blasting specifications in the oil & gas industry
		  • Cleaning of contaminants
		  • Surface profile
		• Pre-cleaning of substrate surface from contaminants such as:
		  • Oil
		  • Grease
		  • Salt
		• Rust grades and the different standards of surface preparation
		• Coating defects contributed by poor or improper surface preparation
		• Handling of blasting activities
		  • Compressed air volume, pressure, dryness and cleanliness
		  • Blasting angle and distance
		• Safe working practices:
		  • Working at a height
		  • Working in a confined space
		  • Housekeeping at the work site
			• Sizing and application of abrasive materials
			• Basic troubleshooting of blasting and painting equipment
				• Understand the theory of protective coating
				• Understand the requirements of surface preparation
				• Understand the requirements of paint application.
				• Code of practices, procedures, specifications, standards, requirements and working instructions related to blasting and painting works
				• Roles of each member in a blasting and painting team
				• Project execution
				• Work sequence
				  • Work schedule
				  • Progress tracking
				• Quality requirements of the finished work
				• Selection and implementation of remedial actions such as:
				  • Spalling
				  • Blistering
				  • Cracking	

ABILITIES	• Comply with safety regulations in the blasting and painting field
	• Apply basic usage of technical data
	• Apply different blasting methods
	• Perform set up and tear down of blasting equipment
	• Perform safety measures during setup and tear down of blasting equipment
		• Interpret blasting requirements
		• Identify steel and fabrication defects such as rust grades
		• Carry out different standards of surface preparation such as:
		  • SA 2.0
		  • SA 2.5
		  • SA 3.0
		• Carry out preparation work prior to blasting
		  • Pre-cleaning work
		  • Protection work such as masking
		• Maintain the condition of blasting equipment and tools
		• Check safety features of blasting equipment
		• Identify unsafe work site conditions
		• Check dryness and cleanliness of compressed air pressure
			• Determine the suitability of blasting materials
			• Monitor and advise on mixing or change-out of abrasive materials
			• Perform troubleshooting of blasting or painting equipment and determine repair procedure
				• Monitor surface preparation according to specifications
				• Monitor the application of paints according to specifications
				• Supervise work quality to the relevant code of practice, procedures, specifications, standards, requirements and working instructions
				• Assign tasks to the blasting and painting crew
				• Evaluate daily work progress and time to completion
				• Check on the quality of the finished work
				• Select and implement remedial actions	

TSC CATEGORY	1.1.5 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	PAINTER				
TSC DESCRIPTION	Painting describes applying paint on prepared substrate by conventional or airless spraying, or by brush or roller in an industrial environment.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	Painter Assistant	Painter	Blasting & Painting Foreman	Blasting & Painting Supervisor	Blasting & Painting Superintendent

KNOWLEDGE	• Safe work practices, rules and regulations in painting
	• Types of paint and their drying or curing method(s) and factors
	• Drying time, pot life, volume solid and shelf life
	• Safety data sheet and product data sheet
	• Paint and coating application method using different types of application equipment
	• Safety features of spraying equipment
	• Setting up painting equipment
		• Surface preparation methods and requirements
		• Paint application methods and requirements
		• Painting systems and paint application specifications
		• Methods of paint application and its advantages and limitations
		• Mixing of two-pack paint, the requirement of thinning, minimum and maximum overcoating time and pot life of mixed paint
		• Paint faults and coating defects due to poor or incorrect surface preparation and poor paint or coating application
		• Dangers related to flammability of painting materials, solvent vapour and skin contact with thinner or solvent
		• Safety features of spraying equipment
		• Safe working practices including working at a height, working in confined spaces and housekeeping at the work site
		• Safety data sheet and product data sheet
		• Setting up painting equipment
		• Troubleshooting painting
			• Sizing and application of abrasive materials
			• Basic troubleshooting of blasting and painting equipment
				• Understand the theory of protective coatings
				• Understand requirements of surface preparation
				• Understand requirements of paint application
				• Code of practices, procedures, specifications, standards, requirements and working instructions related to blasting and painting works
				• Roles of each member in a blasting and painting team
				• Project execution
				• Work sequence
				  • Work schedule
				  • Progress tracking
				• Quality requirements of the finished work
				• Selection and implementation of remedial actions such as:
				  • Spalling
				  • Blistering
				  • Cracking	

		equipment • Wet film thickness monitoring			

ABILITIES	• Comply with safety regulations inthe blasting and painting field
	• Apply technical data sheet
	• Apply different application equipment
	• Perform set up and tear down of painting equipment, accessories and hoses
	• Perform safety measures during setup and tear down of painting equipment
		• Interpret painting requirements based on specifications
		• Apply methods of paint application and understand the advantages and limitations of each method
		• Carry out preparation work prior to painting
		  • Cleaning of the substrate surface
		  • Protection work like masking
		  • Enclosure and mixing of paints
		• Maintain paint spraying equipment and tools
		• Check safety features of paint spraying equipment
		• Adhere to safety procedures and identify unsafe conditions
		• Check compressed air dryness and cleanliness
			• Determine the suitability of blasting materials
			• Monitor and advise on mixing or change-out of abrasive materials
			• Perform troubleshooting of blasting or painting equipment and determine repair procedure
				• Monitor surface preparation to specifications
				• Monitor the application of paints to specifications
				• Supervise work quality to relevant code of practice, procedures, specifications, standards, requirements and working instructions
				• Assign tasks to the blasting and painting crew
				• Evaluate daily work progress and time to completion
				• Check on the quality of the finished work
				• Select and implement remedial actions	

TSC CATEGORY	1.1.6 PLANT MAINTENANCE / PLANT TURNAROUND/ PROJECT WORKS				
TSC	COATING INSPECTION				
TSC DESCRIPTION	Coating Inspection describes quality check and compliance monitoring activities with blasting and painting project specifications				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	LEVEL 2	**LEVEL 3**	**LEVEL 4**	LEVEL 5
			Blasting & Painting Quality Controller	**Coating Inspector**	Senior Coating Inspector

KNOWLEDGE			• Basic blasting and painting controlled parameters which include:
			  • Substrate temperature
			  • Relative humidity
			  • Dew point
			• Surface preparation standards and requirements
			• WFT (Wet Film Thickness) and DFT (Dry Film Thickness) measurements
			• Paint failures and coating defects
			• Use QC (Quality Control) tools and equipment for coating check
			• Basic understanding of protective paint or coating systems to a variety of substrates
			• Surface preparation, coating application, inspections to clients/industry and meeting government standards
			• Coating QC inspection reporting
				• In-depth knowledge of blasting and painting controlled parameters which include:
				  • Substrate temperature
				  • Relative humidity
				  • Dew point
				• In-depth knowledge of protective paint or coating systems to a variety of substrates
				• In-depth knowledge of surface preparation, coating application, inspections to clients/industry and government standards
				• Coating QC (Quality Control) inspection reporting
				• PQT (Painting Qualification Test)
				• Equipment or tools for QC inspection activity	

ABILITIES			• Monitor surface preparation quality • Review coating specifications and painting system matrix • Monitor paint storage and preservation • Monitor paint preparation and coating application methods • Identify coating defects • Perform QC reporting	• Prepare NCR (Non-Conformance Report) on coating defects • Interpret coating indications or findings • Review specifications of coating project and ITP (Inspection Testing Plan) • Coordinate and witness PQT • Review qualified blasters and painters	

TSC CATEGORY	1.1.7 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	THERMAL SPRAY COATING				
TSC DESCRIPTION	The thermal spray coating applicator carries out thermal spray coating activities by Arc spray or Flame spray system.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	**LEVEL 2** **Thermal Spray Coating Applicator**	LEVEL 3 Thermal Spray Coating Foreman	LEVEL 4 Thermal Spray Coating Supervisor	LEVEL 5

KNOWLEDGE		• Physical principles of thermal spraying
		• Thermal spray coating system specification in the Oil & Gas industry
		• Methods of thermal spray coating application and its advantages and limitations
		• Operating parameter effects on coating properties
		• Testing methods and current industry acceptance criteria
		• Common thermal spray coating defects and the remedies and repair methods available
		• Safe working practices
		  • Working at a height
		  • Working in a confined space
		  • Housekeeping at the work site			

ABILITIES		• Interpret the coating requirements based on specifications
		• Apply coating application methods
		• Carry out preparation work
		  • Cleaning of substrate surface
		  • Protection work such as masking and enclosure
		• Maintain and setup thermal spraying equipment
		• Check safety features of thermal spray coating equipment
		• Identify unsafe worksite conditions
		• Check the dryness and			

		cleanliness of compressed air			

TSC CATEGORY	1.1.8 PLANT MAINTENANCE				
TSC	CORROSION MONITORING				
TSC DESCRIPTION	Corrosion monitoring works describes the technical and practical fundamentals of the theoretical knowledge and practical techniques related to corrosion monitoring systems and technology. This includes the monitoring of internal and external corrosion of piping and equipment using destructive and non-destructive testing methods throughout the plant or facility operations life cycle which covers all aspects of operating such as periodic monitoring, surveillance, maintenance or shutdown.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	**LEVEL 2**	**LEVEL 3**	LEVEL 4	LEVEL 5
		Corrosion Monitoring Practitioner	**Senior Corrosion Monitoring Practitioner**		

KNOWLEDGE		• Fundamentals of corrosion and electrochemistry for corrosion monitoring
		• Principles of corrosion inhibition and preservation
		• Principles of cathodic protection and monitoring
		• Principles and awareness of corrosion measurement and classification
		• Principles of protective coating
		• Corrosion monitoring techniques and measurements
		  • Corrosion coupons
		  • ER probe
		  • LPR probe
		• Corrosion monitoring techniques and measurements such as ultrasonic testing thickness gauging and other specialised corrosion monitoring methods
		• Standards and codes of practice in the relevant application sector
		• HSE issues relating to corrosion monitoring tasks
			• Principles of corrosion measurement, classification and corrosion management framework
			• Importance of testing and monitoring of corrosion processes
			• Real-time corrosion testing and monitoring system architecture
			• Corrosion monitoring techniques and measurements
			  • Bio probes
			  • Sand probes
			  • Online real-time thickness probes
			• Corrosion sampling and testing techniques
			  • Soil and water sampling
			  • Corrosion product sampling
			  • pH and alkalinity testing
			  • Conductivity testing
			  • Process stream analysis
			  • Metal ion analysis
			  • Microbiological analysis
			  • Residual inhibitor analysis
			  • Metal loss analysis
			• Understanding appropriate methods of sample collection and preservation		

ABILITIES		• Check calibration validity of equipment • Setup measuring and testing equipment • Verify equipment settings • Acquire corrosion rate using ER Probe and LPR Probe • Prepare a report of measurements results • Comply with safety requirements related to corrosion monitoring in the application sector, tasks and competence level • Perform risk assessments of safety requirements related to corrosion monitoring in the application sector, tasks and competence level	• Collect general information for design purposes • Perform retrieval and replacement of coupons and probes • Analyse and measure weight loss of corrosion coupons • Perform Bioprobe retrieval and preservation of specimen • Perform corrosion sampling and testing • Inspect corrosion monitoring system installation for damages, proper installation and functioning • Perform basic maintenance on coupons and probes systems • Classify the results of the measurements • Prepare technical reports		

TSC CATEGORY	1.1.9 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	ROTATING EQUIPMENT VIBRATION MONITORING				
TSC DESCRIPTION	Rotating equipment works describe the activities of overhauling, components cleaning, repair or replacement, restoring, and testing of rotating equipment to its intended function. Reinstallation of the rotating equipment also involves alignment works and piping tie-ins. Vibration monitoring and analysis will be performed during test runs, start-ups, commissioning and normal operations.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**	LEVEL 5
		Certified Rotating Equipment Practitioner Level 1	**Certified Rotating Equipment Practitioner Level 2**	**Certified Rotating Equipment Practitioner Level 3**	

KNOWLEDGE		• Fundamentals of maintenance and condition monitoring
		• Types and application of equipment including overhaul process and maintenance activities
		  • Pumps
		  • Blowers and fans
		  • Gearboxes
		• Application of applicable International Codes and Standards for rotating equipment such as ISO/API/ANSI/ASME
		• Safe work practices which include:
		  • Working at a height
		  • Working in a confined space
		  • Housekeeping at the workplace
			• Fundamentals of vibration monitoring (offline)
			• Types and application of equipment including overhaul process and maintenance activities
			  • Reciprocating engines (diesel engine and gas engine)
			  • Compressors and expanders
			• Rotating equipment installation and alignment
			• Root Cause Analysis (RCA) methodology such as 5-Why and Ishikawa Fishbone diagram
			• Basic troubleshooting and interpreting rotating equipment defects
				• Advanced vibration monitoring (offline and online)
				• Types and application of equipment including overhaul process and maintenance activities
				  • Gas turbines
				  • Steam turbines
				• Rotating equipment balancing
				  • Shop balancing
				  • In-situ balancing
				• Failure Mode Effects Analysis (FMEA)
				• Advance troubleshooting and interpreting rotating equipment defects	

ABILITIES		• Apply types of maintenance strategies and condition monitoring
		• Perform basic maintenance, overhaul, and inspection activities for rotating equipment
		  • Pumps
		  • Blowers and fans
		  • Gearboxes
		• Comply with safe work practices
		  • Working at a height
		  • Working in a confined space
		  • Housekeeping at the workplace
			• Perform offline vibration monitoring and analysis
			• Perform maintenance, overhaul, and inspection activities for rotating equipment
			  • Reciprocating engines (diesel engine and gas engine)
			  • Compressors and expanders
			• Perform Root Cause Analysis (RCA)
			• Perform basic troubleshooting and interpret defects
			• Produce maintenance, inspection, and vibration analysis report
			• Apply applicable International Codes and Standards for rotating equipment including ISO/API/ANSI/ASME
				• Perform offline and online advanced vibration monitoring and analysis
				• Perform major maintenance, overhaul, and inspection activities
				  • Gas turbines
				  • Steam turbines
				• Lead Failure Mode Effects Analysis (FMEA) process
				• Perform complex troubleshooting, analyse and interpret defects	

TSC CATEGORY	1.1.10 PLANT MAINTENANCE / PLANT TURNAROUND / PROJECT WORKS				
TSC	FLANGE MANAGEMENT				
TSC DESCRIPTION	Flange management works describe the activities of ensuring mechanical joint integrity of equipment nozzles or piping flanges to prevent joint leakage. The job involves ensuring proper components are used and tightening methods are employed to provide joint integrity assurance and leak-free operations.				
TSC PROFICIENCY DESCRIPTION	**LEVEL 1** **Mechanical Helper (Joint Integrity Team)**	**LEVEL 2** **Joint Maker & Controlled Bolting Technician (CBT)**	**LEVEL 3** **JIT Supervisor/Coordinator**	**LEVEL 4** **JIT Inspector/Verifier**	**LEVEL 5** **JIT Specialist**

KNOWLEDGE	• Basic understanding of isometric drawing and GA drawing
	• Flange joint components
	  • Flange types and specifications
	  • Gasket types and specifications
	  • Bolts and nuts specifications
	• Joint component handling and storage
	• Types and effects of lubrication
	• HSE compliance
	  • Working at a height
	  • Working in a confined space
	  • Housekeeping at the workplace
		• Understand the torque value table
		• Joint component inspection
		• Joint component defect
		• Flange joint assembly
		  • Level 2a (Joint Maker): Manual Torque Wrench (MTW)
		  • Level 2b (CBT): Hydraulic Torque Wrench (HTW) and Hydraulic Bolt Tensioning (HBT)
		• Interpretation of torque value
		• Tightening sequence
		• Flange joint disassembly
			• Leak Free Philosophy
			• Joint Integrity Team (JIT) planning
			• Manpower organisation, roles and responsibilities
			• Materials preparation
			  • Joint tag
			  • Component spare strategy
			• Tool and equipment preparation and calibration
			• Method and Execution
			  • Joint List Registration Flow
			  • Joint Criticality and JIT Masterlist - Inputs and Outputs
			  • JIT Form and Leak Control
			  • JIT Inspection Report
			• JIT Pre-Execution, Execution, Post-Execution
				• ASME PCC-1 standards and procedures
				  • Torque value calculation
				  • Component defect
				  • Tightening sequence
				• Tool and equipment inspection and calibration
				• Advanced tightening sequence
				  • Bolt load distribution
				• Ultrasonic Test (UT) inspection
				  • Basic UT methodology for bolt elongation
					• Understand relevant codes and standards: ASME PCC-1, ASME PCC-2, or EN1591, ASME 16.5, ASME 16.47, ASME B16.20, ASME 18.2.1
					• Theory of clamping load, stress and strain such as Young's Modulus
					• Primary and secondary stresses impact joint
					• Material specifications for
					  • Flange
					  • Gasket
					  • Bolt and nut
					• Bolt load calculation
					• Tightening sequence and its effect on the flange joint integrity
					• Risk assessment for any technical deviation
					• Joint integrity technology

ABILITIES	• Identify static equipment and piping installation requirements
	• Prepare installation tools, equipment, and materials
	• Carry out joint installation
	• Carry out joint removal
	• Apply lubricant onto the stud-bolts and nuts
	• Carry out flange surface cleaning
	• Carry out housekeeping at the workplace
		• Perform flange joint assembly and alignment
		• Apply lubricant on stud bolts and nuts
		• Select the correct torque value
		• Level 2a (Joint Maker):
		  • Perform flange joint tightening technique using MTW
		• Level 2b (CBT):
		  • Perform flange joint tightening technique using HTW and HBT
		  • Perform flange joint disassembly
		• Use digital tools such as
		  • Tablets
		  • Digital torque wrench
			• Prepare work schedule and manpower planning
			• Organise and coordinate
			  • Materials and consumables
			  • Tools and equipment
			• Prepare a joint master register
			• Prepare final joint completion report
			• Navigate digital platform
			  • Web-based dashboard or
			  • Any online joint register
				• Conduct JIT training and assessment
				• Verify correct specification
				• Verify bolting tools output including pressure and clamping force
				• Inspect flange joint tightness
				  • Flange visual conditions
				  • Flange parallelism
				  • Flange spacing or gap
				  • Bolts and nut looseness
				  • Uneven stud-bolts length
				  • Gasket specifications
				  • Tightening method and specifications
					• Calculate torque values and HBT pump pressure
					• Make decision on which digital technology to use
					• Evaluate defect on joints
					• Propose repair recommendations
					• Perform risk assessment and technical deviations
					• Bolt load verification using UT
					• Use digital platform to analyse data involving manpower planning and manpower efficiency

		• Perform digital tools setting		• Troubleshoot digital tools • Evaluate defect on joints • Propose repair procedure such as in-situ machining • Remote joint acceptance or approval through digital platform or dashboard	

TSC CATEGORY	1.1.11 PLANT MAINTENANCE				
TSC	CATHODIC PROTECTION MONITORING				
TSC DESCRIPTION	Cathodic protection monitoring works describe the activities of ensuring CP systems are properly installed and commissioned as per the design document, are in healthy condition and provide adequate protection to the associated structure. The cathodic protection system is available as Sacrificial Anode Cathodic Protection System (SACP) or Impressed Current Cathodic Protection System (ICCP), which is installed to protect structures such as static equipment, piping and pipelines against corrosion often in combination with a coating system.				
TSC PROFICIENCY DESCRIPTION	LEVEL 1	**LEVEL 2**	**LEVEL 3**	LEVEL 4	LEVEL 5
		Cathodic Protection (CP) Practitioner	**Senior Cathodic Protection (CP) Practitioner**		

KNOWLEDGE		• Electricity fundamentals relevant to CP application
		• Electrical risks and hazards
		• Lock-Out, Tag-Out (LOTO) rules and procedures
		• Electrical, mechanical and civil drawings
		• Basic aqueous corrosion theory
		• Theory, principles, and components of the CP system
		• Types of galvanic and impressed current anodes
		• Types of CP systems
		  • Above-ground storage tanks
		  • Onshore / offshore pipelines
		  • Underground plant piping
		  • Offshore structures
		  • Underground pressure vessel, storage tank
		  • Storage tanks and vessel internals
		  • Jetty
		  • Steel rebar in concrete
		• Standards and codes for CP application
		• CP measurements and testing
		  • Structure-to-electrolyte ON potential
		  • CP current
		  • Four-pin Wenner
		  • Close Interval Potential Survey(CIPS)
		• ACVG & DCVG testing
			• Corrosion and electrochemistry relevant to CP application
			• Types and application of reference electrodes
			• Performance criteria of CP systems
			• Diagnostics of CP systems
			• Conditions attributed by interference
			• Implication of stray currents and interference
			• Onshore and offshore pipeline survey techniques
			• Testing and pre-commissioning of CP systems
			• Operation, maintenance and trouble shooting
			• CP measurements and testing procedures
			  • Instant OFF structure-to-electrolyte potential
			  • Soil box method
			  • Pipeline Current Mapping (PCM)
			  • Isolation testing
			• Components and working principles of Transformer Rectifier Unit (TRU)
			• Types and rating of cables in the CP application
			• Methods and techniques of		

		procedures	cable connection • Compression • Soldering		

		• Errors and uncertainty on specific measurement and testing
		• CP interference
		• Safe work practices
		  • Working at a height
		  • Working in a confined space
		  • Housekeeping at the workplace
			• Exothermic welding
			• Pin brazing		

ABILITIES		• Verify the calibration status of CP measuring and testing equipment
		• Set up and perform CP measurement and testing
		  • Structure-to-electrolyte ON potential
		  • CP current
		  • Four-pin Wenner
		• Perform a Close Interval Potential Survey (CIPS)
		• Assist in ACVG & DCVG testing
		• Collect CP performance data of simple CP systems
		• Inspect and measure DC power supply output current and voltage
		• Measure shunts output
		• Perform visual inspection of simple CP system components
		• Carry out basic maintenance work on simple CP Systems
			• Perform verification test of working portable reference electrode
			• Perform verification test of stationary reference electrode
			• Set-up and perform CP measurement and testing
			  • Synchronisation of current interruptions
			  • Structure-to-electrolyte instant OFF Potential
			  • Structure-to-electrolyte potential depolarisation
			  • Soil box methods
			  • Electrical continuity
			  • Electrical isolation
			  • Locating protected structure and foreign structure
			  • Close Interval Potential Survey (CIPS)
			  • Pipeline Current Mapping (PCM)
			• Perform ACVG and DCVG tests under supervision
			• Assist in interference testing and measurement
			• Report measurements including comparison to specified CP criteria
			• Inspect and verify overall operations of DC power supply
			• Troubleshoot basic rectifier fault		

			• Perform maintenance on DC power supply components • Perform routine adjustment of current output to maintain performance • Collect samples for laboratory corrosion analysis		

PROPOSED COMPETENCIES TRAINING AND CERTIFICATION PROGRAMME

NO.	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(1)	**L3: Welding Inspector** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Understanding of WPS, PQR and WQT • Identify and measure weld discontinuities and defects • Misalignment • WPS compliance check • Safety performance check • Basic NDT for welding inspection • Mechanical test for welding qualification	N/A	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • Working in a confined space (if required) **Competency Certification** • AWS D1.1 Welding Inspector • SKM Welding Inspector • CSWIP/PCN 3.1 or 3.2

(2)	**L4: Welding Supervisor**
	Relevant Activities
	• Maintenance
	• Turnaround
	• Project Works
		• Manual welding technique
		• Semi-automatic welding technique
		• Drawings and symbols which include:
		  • Shop drawings
		  • Welding symbols
		• Types of welding defects and repair procedures
		• Basic understanding of welding procedures
		  • Welding Procedure Specification (WPS)
		  • Welder Qualification Test (WQT)
		• Hazard risk assessment
		  • Job Method Statement (JMS)
		  • Job Hazard / Safety Analysis (JHA/JSA)
		  • Permit to Work (PTW)
		  • Toolbox briefing
		• Work planning and scheduling
		  • Materials and consumables planning
		  • Tools and equipment optimisation
		  • Manpower assignment
			• Supervisory skills
			• Communication skills
			• Strategic site planning
				Mandatory HSE Certification
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• DOSH Authorised Entrant & Standby Person (AESP) (if required)

(3)	**L5: Welding Specialist** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Welding Procedure Specifications (WPS) • Basic NDT for welding inspection • Mechanical test for welding qualification	• Coaching skills • Technical writing skills • People management skills • Interpersonal skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required)

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	

(4)	**L1: Hydro-Jetting Assistant**
	Relevant Activities
	• Turnaround
		• Overview of hydro-jetting operations
		  • Safe operating procedure
		  • Hazard associated with hydro-jetting activities
		• Safe work practices
		  • Working at a height
		  • Working in confined spaces
		  • Housekeeping at the workplace
		  • Proper use of PPE
			N/A	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• Working in a confined space (if required)
				Competency Certification
				• IMM Certified Hydro-Jetting Fitter*
				• NIOSH for Hydro-Jetting Fitter **
				*To be developed
				**Propose for NIOSH to develop a Hydro-Jetting Fitter

(5)	**L2: Hydro-Jetting Operator**
	Relevant Activities
	• Turnaround
		• Handling of hydro-jetting equipment
		  • Safety feature of the hydro-jetting machine
		  • Hazards and risks of hydro-jetting operation
		• Basic hydro-jetting operations and procedures
		  • Manual operation
		  • Semi-automatic operation
		  • Fully automatic operation
		• Basic maintenance and testing of hydro-jetting equipment:
		  • Tubes and pipes cleaning nozzles
		  • High-pressure rigid and flexible lances
		  • Foot-operated and pressure-regulating valves
		  • Pressure gauge and safety valve
		• Emergency shutdown procedures
			N/A	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• Working in a confined space (if required)
				Competency Certification
				• IMM Certified Hydro-Jetting Operator Level-1*
				• NIOSH for Hydro-Jetting Operator**
				*To be developed
				**Propose for NIOSH to develop Hydro-Jetting Operator

(6)	**L3: Hydro-Jetting Senior Operator**
	Relevant Activities
	• Turnaround
		• Hazard and risk assessment:
		  • Job Method Statement (JMS)
		  • Job Safety/Hazard Analysis (JSA/JHA)
		  • Permit to Work (PTW)
		  • Toolbox briefing
		• In-depth knowledge of hydro-jetting equipment:
		  • Hydro-jetting pressure system
		  • Electric control panel or pneumatic system
		• Tools and equipment optimisation
		• Understanding of scheduled waste and disposal requirements
			• Coaching skills
			• Communication skills
			• 3R concept: Reduce, Reuse, Recycle
				Mandatory HSE Certification
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• Working in confined spaces (if required)
				Competency Certification
				• IMM Certified Hydro-Jetting Operator Level-2*
				• NIOSH for Hydro-Jetting Operator**
				*To be developed
				**Propose for NIOSH to develop Hydro-Jetting Operator

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	

(7)	**L4: Hydro-Jetting Supervisor**
	Relevant Activities
	• Turnaround
		• Limitation of various types of hydro-jetting pressure systems and troubleshooting cleaning activities
		  • Manual
		  • Semi-auto
		  • Auto
		• Resources planning and work scheduling
		  • Manpower
		  • Tool and equipment
		  • Materials and consumables
		• Application of degreaser or chemicals
		• Types of waste and waste handling
		  • Industrial waste
		  • Scheduled waste
			• Supervisory skills
			• Communication skills
			• Technical writing skills
				Mandatory HSE Certification
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• Working in confined spaces (if required)
				Competency Certification
				• NIOSH for Hydro-Jetting Supervisor**
				**Propose for NIOSH to develop Hydro-Jetting Supervisor

(8)	**L1: Insulation Assistant** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	N/A	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required)
(9)	**L2: Insulation Installer** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	N/A	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Insulation Installer L2
(10)	**L3: Insulation Foreman** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	• Supervisory and leadership Skills • Interpersonal and communication Skills • 3R concept: Reduce, Reuse, Recycle	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Insulation Installer L2

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(11)	**L4: Insulation Supervisor** **Relevant Activities** • Maintenance • Turnaround • Project Works	• IMM Insulation Installer L2 Certification Training • SSPC Insulation Inspector L1 Training • IMM Insulation Supervisor and Inspector	• Interpersonal and communication skills • Technical writing skills • People management skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • SSPC Insulation Inspector L1 • IMM Insulation Supervisor and Inspector* *Propose for IMM to develop IMM Insulation Supervisor and Inspector
(12)	**L5: Insulation Inspector** **Relevant Activities** • Maintenance • Turnaround • Project Works	• SSPC Insulation Inspector L2 • IMM Insulation Supervisor and Inspector	• Interpersonal and communication skills • Technical report writing skills • Quality report writing	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • SSPC Insulation Inspector L2 • IMM Insulation Supervisor and Inspector* *Propose for IMM to develop IMM Insulation Supervisor and Inspector
(13)	**L1: Blaster Assistant** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Introduction to blasting and painting: Theory and practical (blasting work or painting application) • Surface preparation and blasting • Blasting and painting equipment • Paint and thinner • Painting application methods • Common painting system • Coatings quality, defects and remedy • Safe work practices in blasting and painting	• Housekeeping at the workplace practices: The 3R concept (Reuse, Recycle, Reduce)	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified B1 B2 Assistant Blaster and Painter • AMPP Coating Application Specialist (CAS) Level 1

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(14)	**L2: Blaster Relevant Activities** • Maintenance • Turnaround • Project Works	• Introduction to corrosion • Composition and important types of paint • Standards and paint materials data sheets • Surface preparation • Paint faults and coating defects • Importance of good quality assurance • Worksite HSE work practices in blasting and painting	• Housekeeping at the workplace practices: The 3R concept (Reuse, Recycle, Reduce)	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified Protective Coating Technician Level 1(Blaster) • CIDB-CSWIP Blasting & Painting Operative • JPK SKM L1 Blasting Operation* • AMPP Abrasive Blaster Certification (C7) *To be further upgraded to industry standards
(15)	**L1: Painter Assistant Relevant Activities** • Maintenance • Turnaround • Project Works	• Introduction to blasting and painting: Theory and practical (blasting work or painting application) • Surface preparation and blasting • Blasting and painting equipment • Paint and thinner • Painting application methods • Common painting system • Coatings quality, defects, and remedy • Safe work practices in blasting and painting	• Housekeeping at the workplace practices: The 3R concept (Reuse, Recycle, Reduce)	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified B1B2 Assistant Blaster & Painter • JPK SKM L2 Painting Operation* • AMPP Coating Application Specialist (CAS) Level 1 *To be further upgraded to industry standards
(16)	**L2: Painter Relevant Activities** • Maintenance • Turnaround • Project Works	• Introduction to corrosion • Composition and important types of paint • Standards and paint materials data sheets • Surface preparation • Paint faults and coating defects • Importance of good quality assurance • Worksite HSE work practices in blasting and painting	• Housekeeping at the workplace practices: The 3R concept (Reuse, Recycle, Reduce)	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified Protective Coating Technician Level 1(Painter) OR Level 2 (Multiskilled) • CIDB-CSWIP Blasting & Painting Operative • AMPP Spray Application Certification (C12) • JPK SKM L2 Painting Operation* *To be further upgraded to industry standards

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(17)	**L3: Blasting & Painting Foreman** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Composition and important types of paint • Standards and paint materials data sheets • Paint application • Surface preparation • Paint faults and coating defects • The importance of good quality assurance • HSE safe practices compliance	• Housekeeping at the workplace practice: The 3R concept (Reuse, Recycle, Reduce) • Teamwork skills • Delegation skills • Technical writing skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified Protective Coating Technician Level 2 (Multiskilled) • AMPP Coating Application Specialist (CAS) Level 2
(18)	**L4: Blasting & Painting Supervisor** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Fundamentals of protective coating for corrosion protection • Surface preparation good practice control, coating handling and application • Coating degradation, defects and failures • Conversion and calculation • HSE legal requirements	• Communication skills • Technical writing skills • 3R concept: Reduce, Reuse, Recycle • Critical thinking skills • Supervisory skills • Problem solving skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified Blasting & Painting Supervisor (BPS) • AMPP Protective Coating Specialist -Advanced (PCS 2)
(19)	**L3: Blasting & Painting Quality Controller** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	• Interpersonal and communication skills • Technical writing skills • Quality report writing	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Coating Inspector L1 • AMPP (NACE / SSPC) Certified Protective Coating Inspector L1 • ICorr Certified Protective Coating Inspector L1 • FROSIO Certified Protective Coating Inspector L1

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(20)	**L4: Coating Inspector** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	• Interpersonal and communication skills • Technical writing skills • Quality report writing	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Coating Inspector L2 • AMPP (NACE / SSPC) Certified Protective Coating Inspector L2 • ICorr Certified Protective Coating Inspector L2 • FROSIO Certified Protective Coating Inspector L2 • BGAS-CSWIP Certified Painting Inspector Grade 2
(21)	**L2: Thermal Spray Coating Applicator** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Setting up of the thermal spray coating equipment • Inspection and maintenance of thermal spray coating equipment and tools • Types of PPE uses and applications • Scheduled waste collection and disposal requirement		**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) • DOSH Authorised Entrant & Standby Person (AESP) (if required) **Competency Certification** • IMM Certified Thermal Spray Coating Applicator

(22)	**L2: Corrosion Monitoring Practitioner**
	Relevant Activities
	• Maintenance
		• Basic corrosion theory and forms of corrosion
		• Corrosion control and monitoring techniques
		• Theory, application, and hands-on training
		  • Corrosion coupon
		  • ER probes
		  • LPR probes
		  • Ultrasonic thickness gauging
		• Types of corrosion coupons and probes by OEM or vendors
		• Corrosion inhibition and cathodic protection monitoring and process corrosion monitoring
			• Technical report writing skills	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• DOSH Authorised Entrant & Standby Person (AESP) (if required)
				Competency Certification
				• IMM Corrosion Monitoring Practitioner Level 1

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	

(23)	**L3: Senior Corrosion Monitoring Practitioner**
	Relevant Activities
	• Maintenance
		• Basic corrosion theory and forms of corrosion and damage mechanisms
		• Basic theory and application of instrumentation and data acquisition system for online real-time monitoring
		• Theory, application, and hands-on training
		  • Chemical injection system
		  • Sand probes
		  • Online real-time thickness measurement
		  • Soil and water sampling
		  • Corrosion product sampling
		  • pH and alkalinity testing
		  • Conductivity testing
		  • Process stream analysis
		  • Metal ion analysis
		  • Microbiological analysis
		  • Residual inhibitor analysis
		• Technical Codes and Standards such as API, NACE/AMPP, ASTM, BS EN, ISO
			• Supervisory skills	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• DOSH Authorised Entrant & Standby Person (AESP) (if required)
				Competency Certification
				• IMM Corrosion Monitoring Practitioner Level 2

(24)	**L2: Certified Rotating Equipment Practitioner Level 1** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Vibration Practitioner Level-1	• Technical writing skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) **Competency Certification** • Certified Vibration Practitioner Cat-1 • JPK SKM L2: Rotating Equipment Maintenance Operation
(25)	**L3: Certified Rotating Equipment Practitioner Level 2** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Vibration Practitioner Level-2	• Supervisory skills • Analytical thinking • Problem solving skills	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) **Competency Certification** • Certified Vibration Practitioner Cat-2

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(26)	**L4: Certified Rotating Equipment Practitioner Level 3** **Relevant Activities:** • Maintenance • Turnaround • Project Works	• Vibration Practitioner Level-3	• Technical writing skills • Manpower planning • Critical and analytical thinking	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) **Competency Certification** • Certified Vibration Practitioner Cat-3
(27)	**L1: Mechanical Helper (Joint Integrity Team)** **Relevant Activities** • Maintenance • Turnaround • Project Works	N/A	N/A	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required)
(28)	**L2: Joint Maker & Controlled Bolting Technician (CBT)** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Hand Torque Bolted (MTW) Connection Technique • Hydraulic Torque (HTW) Connection Technique • Hydraulic Bolt Tension (HBT) Connection Technique	N/A	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) **Competency Certification** • CIDB SKK Jurugegas Mekanikal Tahap 2 • API FMJIT Level 1 • ECITB MJI18 (HBT) Certified Mech Joint Integrity • ECITB MJI19 (HTW) Certified Mech Joint Integrity

(29)	**L3: JIT Supervisor / Coordinator**
	Relevant Activities
	• Maintenance
	• Turnaround
	• Project Works
		• Flange Management: Controlled Bolting Training
		• Hazard risk assessment which includes:
		  • Job Method Statement (JMS)
		  • Job Safety Analysis (JSA)
		  • Permit to Work (PTW)
		  • Toolbox briefing
		• Work planning and scheduling which includes:
		  • Materials and consumables
		  • Planning tools and equipment optimisation
		  • Manpower assignment
			• Supervisory skills
			• Technical writing skills
			• Manpower planning
			• 3R concept: Reduce, Reuse, Recycle
				Mandatory HSE Certification
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				Competency Certification
				• CIDB Sijil SKK Jurugegas Mekanikal Tahap 2
				• API FMJIT Level 1
				• ECITB MJI18 (HBT)
				• MJI19 (HTW) Certified Mech Joint Integrity

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	
(30)	**L4: JIT Inspector / Verifier** **Relevant Activities** • Maintenance • Turnaround • Project Works	• Flange Management Inspection Technique	• Presentation skills • 3R concept: Reduce, Reuse, Recycle	**Mandatory HSE Certification** • CIDB Construction Personnel • NIOSH Oil & Gas Safety Passport • NIOSH Working at Height (if required) **Competency Certification** • CIDB Sijil SKK Jurugegas Mekanikal Tahap 3 • API FMJIT Level 1 • ECITB MJI18 (HBT) & MJI19 (HTW) Certified Mechanical Joint Integrity • EN-1591-4 (HBT and HTW) *To be developed

(31)	**L5: JIT Specialist**
	Relevant Activities
	• Maintenance
	• Turnaround
	• Project Works
		• Basic mechanical engineering knowledge
		  • Metallurgy
		  • Stress and strain
			• Critical and analytical thinking
			• Problem solving Skills
				Mandatory HSE Certification
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				Competency Certification
				• ECITB Level 3
				• API FMJIT Level 3

(32)	**L2: Cathodic Protection (CP) Practitioner**
	Relevant Activities:
	• Maintenance
		• Basic electrical fundamentals
		• Basic corrosion theory
		• Theory and application of Cathodic Protection for corrosion control
		• Application and procedures of related tools and equipment which include:
		  • Digital multimeter
		  • Clamp-on ammeters
		  • Resistivity test instrument
		• CP measurements and testing
		  • Structure-to-electrolyte ON potential
		  • CP current
		  • Four-pin Wenner
		  • Close Interval Potential Survey (CIPS) instrument
		• Understanding of installation, testing, and commissioning of cathodic protection systems
			• Technical report writing skills	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				• DOSH Authorised Entrant & Standby Person (AESP) (if required)
				Competency Certification
				• AMPP Cathodic Protection Tester
				• IMM Cathodic Protection Practitioner Level 2

NO	TECHNICAL SKILLS & COMPETENCIES PROFILE	TRAINING		CERTIFICATION PROGRAMME
		TECHNICAL	SOFT SKILLS	

(33)	**L3: Senior Cathodic Protection (CP) Practitioner**
	Relevant Activities:
	• Maintenance
		• Principles of corrosion and electrochemistry
		• Application and procedures of related tools and equipment which include:
		  • Current interrupters
		  • Isolation checker
		  • Close Interval Potential Survey (CIPS) instrument
		  • Pipeline Current Mapping (PCM) instrument
		  • Pipe locating instrument
		  • ACVG and DCVG instrument
		• CP measurements and testing
		  • Structure-to-electrolyte instant OFF Potential
		  • Structure-to-electrolyte potential depolarisation
		  • Soil box methods
		  • Electrical continuity
		  • Electrical isolation
		  • Close Interval Potential Survey (CIPS)
		  • Pipeline Current Mapping (PCM)
		  • ACVG and DCVG
		  • Interference testing and measurement
		• Installation, testing, inspection, monitoring, pre-commissioning, and troubleshooting of CP components
			• Supervisory skills	**Mandatory HSE Certification**
				• CIDB Construction Personnel
				• NIOSH Oil & Gas Safety Passport
				• NIOSH Working at Height (if required)
				
				Competency Certification
				• AMPP Cathodic Protection Technician
				• IMM Cathodic Protection Practitioner Level 3

ABBREVIATIONS

1. CBT: Controlled Bolting Technician
2. CIPS: Close Interval Potential Survey
3. COA: Certificate of Acceptance
4. CP: Cathodic Protection
5. CTOD: Crack Tip Open Displacement
6. CUI: Corrosion Under Insulation
7. DFT: Dry Film Thickness
8. ER: Electrical Resistance
9. ERP: Emergency Response Plan
10. FCAW: Flux Core Arc Welding
11. FMEA: Failure Mode Effects Analysis
12. GA: General Arrangement
13. GTAW: Gas Tungsten Arc Welding
14. HBT: Hydraulic Bolt Tensioning
15. HSE: Health, Safety & Environment
16. HTW: Hydraulic Torque Wrench
17. ICCP: Impressed Current Cathodic Protection
18. ITP: Inspection Test Plan
19. JHA: Job Hazard Analysis
20. JIT: Joint Integrity Team
21. JMS: Job Method Statement
22. JSA: Job Safety Analysis
23. LOTO: Lock-Out, Tag-Out
24. LPR: Roxar Linear Polarisation Resistance
25. MT: Magnetic Particle Testing
26. MTW: Manual Torque Wrench
27. NCR: Non-Conformance Report
28. NDT: Non-Destructive Testing
29. OEM: Original Equipment Manufacturer
30. P&ID: Piping Process & Instrumentation Diagram
31. PCM: Pipeline Current Mapping
32. PFD: Process Flow Diagram
33. PPE: Personal Protective Equipment
34. PQR: Procedure Qualification Record
35. PQT: Painting Qualification Test
36. PT: Dye Penetrant Testing

ABBREVIATIONS

37. PTW: Permit to Work
38. QC: Quality Control
39. RCA: Root Cause Analysis
40. RT: Radiographic Testing
41. SACP: Sacrificial Anode Cathodic Protection System
42. SAW: Submerged Arc Welding
43. SMAW: Shielded Metal Arc Welding
44. TRU: Transformer Rectifier Unit
45. UT: Ultrasonic Test
46. VT: Visual Testing
47. WFT: Wet Film Thickness
48. WPS: Welding Procedure Specification
49. WQT: Welding Qualification Test

SOURCE

1. HRD Corp Internal Data, Jan. 2022 - July 2022

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