Mechanical Engineer

Technical Competency Map

PIPING AND VALVES				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Piping Systems-000-13	Describe the principles related to piping system operation, safety, reliability and availability, applicable safety codes, standards, common industry practices related to piping. Describe hot tap concepts, piping components (gaskets, fitting etc.). Identify repair and welding procedures.	Participate in the design of piping systems and specify the appropriate piping system components to meet process requirements. Develop and revise specifications and SIS sheets for critical piping systems. Explain manufacturing process.	Design piping systems. Review and approve basic piping ratings, classes, materials, codes and standards. Develop and approve hydrostatic test procedure.	Investigate piping failure and recommend repair methods. Perform piping system stress analysis. Guide others in the application of codes to piping systems. Participate in periodic review of piping standards. Recommend solution to overcome major piping problems. Participate in evaluating manufacturer capability and qualification.
	e-GEX 701	MEX 621	COE 110	MEX 670
	e-GEX 702	e-COE 101	COE 114	WA-124
	e-MEX 101	e-MEX 711	MEX 621	
	e-MEX 715	e-MEX 714	WA-125	
		e-MEX 718		
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**

Control Valves-000-13	**CV-000-13-A:** Describe different types of control valves, its functions, application and related standards.	Define different control valves components and functions. Review specifications, troubleshoot control valves failure and provide recommendations.	Apply control valves selection criteria using vendor specification, sizing program and company standards. Prepare data sheet.	
	e-MEX 733	PCI 103	PCI 114	
	e-PCI 101		WA-125	
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Isolation Valves-000-13	Describe basic valves types and components, applicable service conditions, materials and limitations. Identify pressure-temperature ratings of corresponding materials.	Apply basic selection criteria in identifying applicable valves for various services. Troubleshoot isolation valves failure and provide recommendations.	Review and approve valves selection for different services.	Participate in reviewing corporate standards related to isolation valves.
	e-MEX 101	e-MEX 729	e-MEX 713	WA-124
	e-MEX 735	e-MEX 734	WA-125	
		e-MEX 735		
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Safety Relief Valves-000-13	Describe the types of relief valves and their functions. Identify Saudi Aramco standards, industrial codes and engineering procedures for installing, removing and maintaining safety relief valves.	Participate in preparing Instrument Specification Sheet (ISS) and initiating Form 3099-A (Relief Valve Authorization form).	Investigate failure root causes. Recommend and apply best practices for safety relief valves.	
	PCI 110	PCI 110	PCI 110	
	e-MEX 730		WA-125	

ROTATING EQUIPMENT				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Fundamentals of Rotating Equipment-000-13	**FORE-000-13-A:** List and describe the types, components, functions, principal design factors, operational and maintenance considerations of the following major types of rotating equipment: Pumps, Compressors, Fans, Generators, Motors, Diesel Engine and Gear Boxes.	Describe the selection criteria of the rotating equipment, sub-systems components, materials, the factors involved in the integration of components.		
	AGE 102	e-MEX 701		
	e-MEX 701	WA-123		
	WA-125			
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Compressors-000-13	Identify and describe the basic and major characteristics of compressors and their types.	**C-000-09-BA:** Explain operation philosophy, auxiliaries' functions and safety shutdown system. Participate in the troubleshooting of compressors. Define causes of failure.	Review types, characteristics, standards, codes and size of compressor. Evaluate compressors mechanical components and sub-system. Troubleshoot operating problems.	
	e-MEX 702	COE 114	COE 108	
	WA-125	MEX 212	COE 109	
		e-MEX 702	MEX 212	
		WA-123	MEX 624	
			MEX 625	
			WA-124	
			WA-126	

Skill	Awareness	Basic Application	Skilled Application	Mastery
Gearboxes-000-13	Explain the types, sizing, materials, components, protection, lubrication systems, testing, maintenance and installation of gearboxes. Participate in troubleshooting of gearboxes. Explain the typical problems associated with gearboxes.	Specify and manage the types, sizing, materials, components, protection, lubrication systems, testing, maintenance and installation of gearboxes. Troubleshoot gearbox failures.		
	AGE 102	AGE 102		
	WA-125	WA-123		
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Pumps-000-13	**P-000-13-A:** Describe basic types, characteristics, standards, codes and sizes of pumps used as driven machinery in oil and gas applications. Identify pumps key mechanical components and subsystems, performance, efficiency and factors affecting the driver type.	Evaluate and explain the types, services, performance, sizing, sealing, codes and standards, materials, design, components, controls, protection, subsystems (such as sealing and lubrication systems), testing, maintenance, operation and installation of pumps. Troubleshoot pump failures.	Review and approve new pump package, upgrades and revision of company standards. Troubleshoot pump problems including seals and subsystems.	Analyze and approve performance specifications and supplier's proposals.
	AGE 102	MEX 112	e-EEX 723	MEX 625
	e-MEX 701	MEX 211	MEX 623	WA-124
	e-MEX 707	WA-123	MEX 624	WA-126
	WA-125		MEX 625	

Skill	Awareness	Basic Application	Skilled Application	Mastery
Vibration Measurements and Analysis-000-13	Define vibration terminologies, characteristics, transducers and data instruments, signature plots, alarm and shutdown limits.	Apply basic diagnostics techniques in identifying different types of vibration problems of rotating machineries.		
	MEX 112	MEX 623		
	e-MEX 707	WA-123		
	WA-125			
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Steam Turbines-000-13	Describe basic types, characteristics, standards, codes and sizes of steam turbine.	Explain the types, services, performance, sizing, sealing, codes and standards, materials, design, components, controls, protection, subsystems (such as sealing and lubrication systems), testing, maintenance, operation and installation of stem turbine. Troubleshoot steam turbine failures.		
	AGE 102	COE 110		
	MEX 104	MEX 213		
	MEX 112	MEX 623		
	e-COE 101	MEX 624		
	e-MEX 707	e-MEX 785		
	WA-125	e-MEX 786		
		WA-123		

Skill	Awareness	Basic Application	Skilled Application	Mastery
Gas Turbines-000-13	Describe basic types, characteristics, standards, codes and sizes of gas turbine.	Explain the types, services, performance, sizing, sealing, codes and standards, materials, design, components, controls, protection, subsystems (such as sealing and lubrication systems), testing, maintenance, operation and installation of gas turbine. Troubleshoot gas turbine failures.		
	AGE 102	MEX 214		
	MEX 112	MEX 623		
	e-MEX 707	e-MEX 770		
	WA-125	e-MEX 772		
		WA-123		
PROCESS EQUIPMENT				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**

Heat Exchangers-000-13	Identify the types of heat exchangers and proper application of each type. Identify heat exchangers internal/external components and their purpose. Describe the general types of internal/external coatings used with heat exchangers. Explain the principles related to heat exchangers safety, reliability and availability. Describe performance.	Define, select and apply company and industry heat exchanger codes and standards.	**HE-000-13-SA:** Evaluate heat exchanger failures, recommend repair methods and mitigation of future failures.	
	e-MEX 703	MEX 210	MEX 210	
	e-MEX 704	WA-123	WA-123	
	e-MEX 705			
	e-MEX 706			
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Fired Equipment - Boilers and Heaters-000-00	Describe the basic types of fired and unfired boilers, process heaters, their applications, applicable company codes, standards and statutory requirements related to fired equipment operation and safety in oil and gas industries.			
	MEX 104			
	MEX 105			
	e-COE 101			
	e-MEX 724			
	e-MEX 765			
STORAGE TANKS				

Skill	Awareness	Basic Application	Skilled Application	Mastery
Pressure Vessels and Storage Tanks-000-13	Describe types of tanks and proper application of each type. Identify the types of storage tanks internal/external components and their purpose. Identify the principles related to storage tanks safety, reliability and availability. Identify API, ASME, welding procedures.	Review design, selection of materials, and fabrication of storage tanks in area of responsibility. Apply codes, procedures, specifications and standards related to testing and inspection of storage tanks and associated equipment. Develop tank repair procedures.		
	COE 110	COE 109		
	COE 114	MEX 202		
	e-COE 101	MEX 203		
	WA-125	WA-125		
MAINTENANCE ASSESSMENT AND RELIABILITY				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Rotating Equipment Reliability-000-13	**RER-000-13-A:** Describe rotating equipment planned maintenance program. Effectively use SAP and PI systems to retrieve equipment history and information.	Explain vibration and temperature rotating equipment monitoring systems.	Utilize vibration and temperature monitoring system to predict equipment failure. Identify failure root causes. Analyze data and recommend correction.	
	AGE 102	MEX 112	MEX 620	
	e-MEX 783	e-MEX 777	WA-125	
	WA-125	WA-125		
EHS-MANAGEMENT AND ASSESSMENT				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**

EHS Principles and Policies-000-13	Describe corporate policies relating to environmental protection, loss prevention, and occupational health. Recognize the role of KPI/BSC indicators in measuring the department Environmental, Health and Safety (EHS) performance. List and identify key concepts of incident investigation and reporting and appreciate need for and benefits of audits/assessments.			
	e-ENV 101			
EHS-FUNDAMENTALS AND APPLICATIONS				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**

Fire Protection and Detection Systems-000-00	Describe the different types of fire, hazardous/toxic gas detection and extinguishing systems, and the proper application, design, control and testing of each type. Recognize and identify industry standards such as NFPA, API, FM, UL, ISO that provide codes and standards used for safety systems. Describe HAZOP and other types of risk assessment and mitigation processes. Recognize and observe plant evacuation procedures, environmental and personnel hazards			
	HAZ RECOG-e			
STANDARDS AND PRACTICES				
Skill	**Awareness**	**Basic Application**	**Skilled Application**	**Mastery**
Engineering Forms-000-00	Describe the different types of purchase orders, direct charges, NMRs, ERs, DBSP, project proposal, detail design, engineering forms, technical alerts, LP compliance items, and Inspection Worksheet.	Review different types of purchase orders, direct charges, NMRs, ERs, DBSP, project proposal, detail design, engineering forms, technical alerts, LP compliance items, and Inspection Worksheet.		
	AGE 120	PMT 604		
	PMT 103	e-GEX 702		
	e-GEX 701			

Skill	Awareness	Basic Application	Skilled Application	Mastery