

Overview of Technical Skills and Competencies

Technical Skills and Competencies (TSCs)

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
Business and Organisational Management	Budget Management	Manage budget and finance systems and processes for tracking of budget utilisation to ensure efficient and effective use of budgets				●	●	●
	Business Continuity Management	Develop Business Continuity Plans (BCPs) by executing business impact analyses, enterprise threat and risk analyses, impact scenario evaluations, recovery requirements and solution implementation in the organisation				●	●	●
	Business Networking Management	Establish mutually beneficial relationships with business partners and stakeholders including technical experts, industry associations, potential clients and customers					●	●
	Business Planning Management	Develop business plans by analysing growth opportunities, evaluating the business environment and upkeeping sustainable competitive advantages					●	●
	Change Management	Implement organisational changes smoothly as well as manage reactions to ensure seamless transitions during changes				●	●	●
	Continuous Improvement Management	Apply continuous improvement processes to optimise operating costs, task efficiency and effectiveness in production, services and processes		●	●	●	●	●
	Organisational Analysis Management	Evaluate factors that can affect the organisation's performance as well as strategically assess the organisation's own resources and potential					●	●
	Organisational Resource Management	Implement resource management plans which include defining the organisation's resource requirements, functional roles, job role descriptions, reporting lines, accountabilities and responsibilities				●	●	●
	Procurement Management	Manage the ordering, receipt, review and approval of items from suppliers to meet business goals		●	●	●	●	●
	Project Management	Plan, execute, track and govern projects, which include allocating and managing people resources, time, and budgets, as well as stakeholder engagement and problem resolution			●	●	●	●
	Staff Management	Apply the organisation's human resources policies, procedures and standards to effectively manage staff under the direct control of the position holder, ranging from coordination to directing people and teams			●	●	●	●
	Strategic Service Excellence Management	Establish strategies and operating principles to consistently meet and manage clients' expectations so as to support business requirements				●	●	●
	Strategy Development and Implementation Management	Develop and implement organisational strategic plans and provide direction to the organisation					●	●
	Technical Presentation	Deliver effective and engaging presentations for a variety of audiences				●	●	●
Technical Report Writing	Produce reports with specific information and evidence presented in a clear and structured format		●	●	●			
Third Party Management	Manage third parties such as contractors, suppliers and vendors to ensure control of work and compliance is in full alignment with the organisation's policies and standards		●	●	●	●		

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Data Analytics	Data Analytics System Design	Integrate the use of data analytics within the manufacturing environment for identification of bottlenecks and opportunities for process improvement			●	●	●	
	Data and Statistical Analytics	Interpret and analyse data using statistical techniques to uncover trends and patterns to locate and define new process improvement opportunities	●	●	●	●	●	●
Discipline Engineering Specialisation	Electrical Engineering Management	Manage the design, technical specification, selection, modification and troubleshooting of electrical engineering equipment and systems in process plants			●	●	●	
	Electrical Field Maintenance Management	Interpret and apply routine and non-routine electrical field maintenance and inspection work instructions and regimes to ensure optimal availability and reliability of electrical equipment and control systems in process plants	●	●	●	●		
	Inspection Engineering Management	Manage fixed equipment and piping inspection schemes, materials selection, construction, corrosion control, condition and fitness-for-service through on-stream, risk-based monitoring programmes and downtime inspections, to provide inspection engineering technical support to maintenance, engineering design and project teams		●	●	●	●	●
	Instrumentation and Control Design Engineering Management	Manage the technical design, selection, specification, modification and troubleshooting of instrumentation and control systems in process plants to provide instrumentation and control engineering design and support to production, maintenance and project teams			●	●	●	
	Instrumentation and Control Field Maintenance Management	Perform routine and non-routine instrumentation field maintenance and inspection work to ensure optimal availability and reliability of instrumentation and control devices and systems in process plants	●	●	●	●		
	Instrumentation and Control System Maintenance Management	Interpret and implement maintenance regimes, processes and procedures for programming, configuration and maintenance of control systems to ensure optimal availability and reliability of process plant and equipment			●	●		
	Mechanical Field Maintenance Management	Perform routine and non-routine mechanical field maintenance work to ensure optimal availability and reliability of mechanical rotating and static equipment in process plants	●	●	●	●		
	Mechanical Rotating Equipment Engineering Management	Manage the design, technical specification, selection, modification and troubleshooting of mechanical rotating equipment, structures and systems to provide mechanical engineering discipline support to production, maintenance and project teams			●	●	●	
	Mechanical Static Equipment Engineering Management	Manage the design, technical specification, selection, modification and troubleshooting of mechanical static equipment, structures and systems to provide mechanical engineering discipline support to production, maintenance and project teams			●	●	●	
	Process Analyser Maintenance Management	Interpret and implement maintenance regimes, processes and procedures for maintenance and configuration and inspection of process analysers to ensure their optimal availability and reliability		●	●	●		

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Discipline Engineering Specialisation	Reliability Engineering Management	Manage life cycle costing, root cause failure analyses, reliability modelling and assessments, fit-for-purpose analyses and failure patterns of plant and equipment to provide reliability engineering technical support to production, maintenance and project teams				●	●	●
Discipline Engineering Support Management	Engineering Safety Standards Interpretation	Design and implement appropriate safety and safeguarding engineering solutions standards in accordance with legislative requirements and industry best practices			●	●	●	
	Engineering Support Management	Provide discipline engineering technical support and expertise in technical specifications, modifications, asset integrity and troubleshooting of engineering equipment and systems, to production, maintenance and project teams				●	●	
	Equipment and System Value Engineering Management	Develop and evaluate discipline-specific engineering equipment and systems to continuously improve process plant performance within manufacturers' safe operating parameters and limits				●	●	
	Technology Road Mapping	Plan short-term and long-term goals for the implementation of new and emerging process plant and equipment technologies, to continuously improve plant performance and to make capital out of future market needs					●	●
Emergency Response and Crisis Management	Crisis Management	Establish and implement crisis management frameworks and procedures to deal with disruptive or unexpected crisis situations that threaten to harm the organisation, its stakeholders or the public			●	●	●	●
	Emergency Response and Crisis Management Development and Implementation	Develop and maintain the Emergency Response and Crisis Management (ERCM) framework in accordance with legislative and organisational requirements, comprising policies, standards and procedures				●	●	●
	Emergency Response Management	Respond to emergencies by executing emergency response plans and procedures to mitigate the impact of emergency incidents		●	●	●	●	
Engineering Design and Project Management	Commissioning and Start-Up Management	Manage the commissioning, start-up, and operationalisation of new or modified process plants and equipment			●	●	●	
	Engineering Management of Change	Manage changes made to process plants, equipment and systems to ensure possible hazards and implications to process safety, production and quality are taken into consideration, and such changes are traceable, documented and evaluated			●	●	●	
	Engineering Project Management	Manage engineering projects and coordinate with project teams and stakeholders to achieve project outcomes and objectives			●	●	●	
	Engineering, Procurement and Construction Management	Manage engineering design, procurement and construction for new process plants and/or plant expansion projects			●	●	●	
	Front-End Engineering Design Management	Manage Front-End Engineering and Design (FEED) for process plant and equipment			●	●	●	

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Health, Safety and Environment Management	Environmental Management System Framework Development and Implementation	Develop Environmental Management System (EMS) frameworks and implement procedures and practices to ensure compliance with legal and organisational requirements as well as commitment to environment protection	●	●	●	●	●	●
	Incident Investigation Management	Apply a systematic and objective approach in workplace incident and accident investigations which include responding, reporting, gathering data and information, root cause analyses, implementation and review of corrective and preventive measures, to prevent recurrence of incidents and accidents		●	●	●	●	
	Safe System of Work Development and Implementation	Develop Safe System of Work (SSoW) frameworks and implement practices to ensure a safe and reliable environment for operations, maintenance and contracting activities	●	●	●	●	●	●
	Workplace Safety and Health Framework Development and Implementation	Develop Workplace Safety and Health (WSH) frameworks and implement procedures and practices to ensure a safe and reliable workplace environment	●	●	●	●	●	●
	Workplace Safety and Health Hazard Identification and Risk Control Management	Implement a systematic approach for hazard identification and risk assessment to effectively eliminate or reduce risks	●	●	●	●	●	
Laboratory Management	Laboratory Data Reporting and Analysis Management	Manage laboratory data for reporting and analysis purposes, ranging from collation, record, access and retrieval from the laboratory information management systems (LIMS)	●	●	●	●	●	●
	Laboratory Equipment Maintenance and Calibration Management	Maintain laboratory equipment to ensure maximum availability of equipment and accuracy of measurements based on the organisation's standards and vendors' operating, maintenance and calibration instructions		●	●	●	●	
	Laboratory Operations Management	Manage laboratory operational activities including all analyses, work planning, scheduling, testing and validation required to meet internal and external customer requirements	●	●	●	●	●	●
	Sample Management	Manage samples in solid, liquid and gas phases, from preparation, sampling, labelling, transportation, storage to disposal in compliance with regulatory and organisational requirements	●	●	●	●	●	●
	Technical Services Management	Manage technical service support to deliver innovative technical solutions and industry applications of products to customers and markets		●	●	●	●	●

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Learning and Development Management	Continuing Professional Development Management	Facilitate the implementation of continuing professional development plans within the organisation to extend, update and maintain the technical competences of professionals				●	●	
	Learning and Development Framework Management	Develop and apply a learning and development framework to manage competency and capability development for the organisation				●	●	●
	Staff Development Management	Manage staff capabilities and competency-based development through learning and development activities to build a skilled workforce			●	●	●	●
	Trainer and Assessor Development Management	Develop and apply trainer and assessor development plans to ensure high quality of workplace learning and assessment programmes are in place				●	●	
	Training, Coaching and Assessment Management	Deliver competency-based on-the-job training, coaching and assessment in line with the processes and procedures of the learning and development framework			●	●	●	
Maintenance Management	Asset Integrity Management	Manage asset integrity of process plants and equipment to ensure optimal availability, reliability and integrity of equipment and systems		●	●	●	●	
	Maintenance Integrity and Reliability Framework Development and Implementation	Develop and implement maintenance integrity and reliability frameworks to ensure availability and reliability of process plants and equipment			●	●	●	●
	Maintenance Planning and Scheduling	Develop and execute maintenance plans and schedules to optimise plant availability and reliability			●	●	●	
	Plant Turnaround Management	Develop and implement plant turnaround management plans to achieve turnaround objectives in coordination with internal and external stakeholders	●	●	●	●	●	
	Preventive Maintenance Management	Develop and implement preventive maintenance workflows, procedures and practices to optimise plant equipment availability and reliability	●	●	●	●	●	●
Process Engineering Management	Process Control	Apply process control to monitor and optimise process plant performance and quality of production output			●	●	●	
	Process Development Management	Manage process development for new or significantly altered raw materials, catalysts or products including early stage piloting, trial runs and full-scale production				●	●	●
	Process Engineering Design	Apply process design principles, engineering standards, control and safety strategies for the development of new and existing process plants				●	●	●
	Process Optimisation	Optimise the production and efficiency of process plants through analysing and reviewing process unit, equipment and plant performance				●	●	●
	Yield Analysis	Apply yield analysis processes and techniques to monitor and drive process yield improvements			●	●	●	

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Process Operations Management	Control Room Operations Management	Perform control room operations in order to monitor and control process units and utilities in a safe and reliable condition by using process control Distributed Control Systems (DCSs)			●	●		
	Engineering Drawing Interpretation and Management	Use engineering drawings including Process Flow Diagrams (PFDs), Piping and Instrument Diagrams (P&IDs), process equipment datasheets, vendor equipment engineering drawings and/or layouts and equipment datasheets, to support operations, maintenance and engineering activities	●	●	●	●	●	
	Feedstock and Product Transfer Operations Management	Perform feedstock and product transfer and blending for continuous and/or batch processes to meet operational requirements	●	●	●	●	●	
	Operations Reporting Protocol Application	Perform operations reporting in accordance with the organisation's communication protocol, procedures and systems	●	●	●	●	●	
	Process Equipment Preparation for Mechanical Work	Prepare process plant and equipment so that they are decommissioned before and commissioned after mechanical work respectively in accordance with safe work practices	●	●	●	●		
	Process Operations Troubleshooting	Perform a structured approach in process operations troubleshooting by using appropriate tools, techniques and engineering documents to identify and locate causes of problems and correct them in a safe and reliable manner		●	●	●	●	
	Process Plant and Equipment Integrity Management	Manage process plant and equipment performance to safeguard and improve plant integrity and energy efficiency			●	●	●	●
	Process Unit and Utilities Operations Management	Operate, monitor and control process units and utilities in order to manage process operations and planning to meet organisational business targets	●	●	●	●	●	●
	Standard Operating Procedure Development and Implementation	Develop Standard Operating Procedures (SOPs) and implement procedures to ensure that process operational tasks for all modes of plant operation are performed correctly and consistently in accordance with regulatory and organisational objectives	●	●	●	●	●	●
	Process Safety Management	Major Hazard Installation Safety Case Management	Develop Major Hazard Installation (MHI) Safety Cases to mitigate risks arising from major accident hazards, and reduce risks to As Low As Reasonably Practicable (ALARP)			●	●	●
Process Safety Management Framework Development and Implementation		Develop Process Safety Management (PSM) frameworks and implement procedures and practices to ensure the integrity and reliability of safeguards and protection systems within process plant operations			●	●	●	
Safety Integrity Levels Management		Analyse and determine appropriate Safety Integrity Levels (SIL) for the selection of safety protection devices and systems to ensure hardware and software meet SIL-rated requirements			●	●	●	

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Quality Assurance and Quality Control Management	Analytical Method Validation	Verify analytical methods used to ensure accuracy, validity and reliability		●	●	●	●	
	Audit and Review Management	Manage audit and review processes and procedures including planning, execution and reporting, to ensure compliance with legal and Quality Management System (QMS) requirements			●	●	●	●
	Materials Qualification	Manage the quality of materials to ensure material specifications conform to product requirements		●	●	●	●	
	Non-Conformance Management	Develop and implement non-conformance procedures and practices to ensure non-conformance materials and products are identified and managed		●	●	●	●	
	Quality Assurance Management	Establish and implement quality assurance (QA) parameters and procedures to ensure compliance with the organisation's Quality Management System (QMS) requirements		●	●	●	●	
	Quality Control Management	Establish and implement quality control (QC) systems and procedures to ensure the quality of products meet desired levels of standards and compliance at all stages	●	●	●	●	●	
Research and Development Management	Applied Research and Development Management	Manage applied Research and Development (R&D) projects and activities to innovate and develop new products and processes				●	●	●
	Innovation Management	Integrate creativity and innovation into the design and development of products and processes while ensuring compliance and non-infringement of existing Intellectual Property (IP) regulations and patents rights				●	●	●
	Product Design and Development	Manage new product design and development from Research and Development (R&D), including initial product design concepts, small batch piloting, market testing and evaluation				●	●	●
	Product Testing Management	Develop product testing protocols and procedures based on product specifications to test and determine the full characteristics of product profiles		●	●	●	●	
Supply Chain and Production Planning Management	Market Demand and Feedstock Management	Manage feed supply for market demand and respond to feed shortfall, opportunity realisation for feed surplus and/or changes in customer demand				●	●	
	Plant Economic Modelling	Develop plant economic models for current operations, and growth scenarios according to business plans, to forecast optimal plant and economic configurations for supply and demand				●	●	
	Production Planning and Scheduling	Establish and implement strategic production planning and scheduling to meet production targets and cycle time indices			●	●	●	
	Supply Chain Management	Develop and maintain supply chain processes, comprising feedstock, production, storage, and export, to ensure supply and demand are managed in an integrated manner and in full alignment with production availability, downtime, plant turnarounds and market conditions				●	●	●

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Technology Application Management	Internet of Things Management	Integrate data from computing devices, equipment and machines in a networked environment to provide specific solutions		●	●	●	●	
	Robotic and Automation System Maintenance	Maintain robotic and automation systems to meet operation requirements and propose strategies for improvements to the automation system's performance	●	●	●	●	●	
	Robotic and Automation Technology Application	Integrate robotic and automation technologies in manufacturing workflows, including process operations, maintenance, logistics and plant surveillance, to enhance productivity and precision and reduce reliance on manual tasks		●	●	●	●	●

Overview of Technical Skills and Competencies

General Description for Technical Skills and Competencies (TSCs)

Level	Responsibility (Degree of supervision and accountability)	Autonomy (Degree of decision-making)	Complexity (Degree of difficulty of situations and tasks)	Knowledge and Abilities (Required to support work as described under Responsibility, Autonomy and Complexity)
6	Accountable for significant areas of work, strategy or overall satisfaction	Empowered to chart direction and practices within and outside of work (including professional field/ community), to achieve/exceed work results	Complex	<ul style="list-style-type: none"> • Synthesise knowledge issues in a field of work and the interface between different fields, and create new forms of knowledge • Employ advanced skills, to solve critical problems and formulate new structures, and/or to redefine existing knowledge or professional practice • Demonstrate exemplary ability to innovate, and formulate new ideas and structures
5	Accountable for achieving assigned objectives, decisions made by self and others	Provide leadership to achieve desired work results; Manage resources, set milestones and drive work	Complex	<ul style="list-style-type: none"> • Evaluate factual and advanced conceptual knowledge within a field of work, involving critical understanding of theories and principles • Select and apply an advanced range of cognitive and technical skills, demonstrating mastery and innovation, to devise solutions to solve complex and unpredictable problems in a specialised field of work • Manage and drive complex work activities
4	Work under broad direction Hold accountability for performances of self and others	Exercise judgement; adapt and influence to achieve work performance	Less routine	<ul style="list-style-type: none"> • Evaluate and develop factual and conceptual knowledge within a field of work • Select and apply a range of cognitive and technical skills to solve non-routine/ abstract problems • Manage work activities which may be unpredictable • Facilitate the implementation of innovation
3	Work under broad direction May hold some accountability for performance of others, in addition to self	Use discretion in identifying and responding to issues, work with others and contribute to work performance	Less routine	<ul style="list-style-type: none"> • Apply relevant procedural and conceptual knowledge and skills to perform differentiated work activities and manage changes • Able to collaborate with others to identify value-adding opportunities
2	Work with some supervision Accountable for a broader set of tasks assigned	Use limited discretion in resolving issues or enquiries. Work without frequently looking to other for guidance	Routine	<ul style="list-style-type: none"> • Understand and apply factual and procedural knowledge in a field of work • Apply basic cognitive and technical skills to carry out defined tasks and to solve routine problems using simple procedures and tools • Present ideas and improve work
1	Work under direct supervision assigned Accountable for tasks	Minimal discretion required. Expected to seek guidance	Routine	<ul style="list-style-type: none"> • Recall factual and procedural knowledge • Apply basic skills to carry out defined tasks • Identify opportunities for minor adjustments to work tasks