

**SKILLS FRAMEWORK FOR BIOPHARMACEUTICALS MANUFACTURING
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Engineering and Maintenance					
TSC	Engineering Drawing					
TSC Description	Create technical drawings for design specifications to guide electrical, mechanical and structural installation works					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
	BPM-ENM-1004-1.1	BPM-ENM-2004-1.1	BPM-ENM-3004-1.1	BPM-ENM-4004-1.1		
	Follow information within a technical drawing	Interpret and modify sections of technical drawings to reflect changes to existing designs	Create full scale technical drawings used to guide electrical, mechanical and structural installation works	Develop new, large scale or high complexity technical drawings, advising on optimal drawing methods based on complexity, cost and time involvement		
Knowledge	<ul style="list-style-type: none"> Types of engineering drawings and symbols Methods of interpreting engineering drawings Common applications of engineering drawings 	<ul style="list-style-type: none"> Principles of two-dimensional (2D) and three-dimensional (3D) engineering drawings Basic principles of mechanical, structural and electrical engineering Types and specifications of biopharmaceuticals manufacturing equipment Types of computer-aided design (CAD) software relevant to creating equipment and outfitting drawings Regulations relating to the installation of manufacturing equipment and systems 	<ul style="list-style-type: none"> Methods of translating installation requirements into two-dimensional (2D) and three-dimensional (3D) equipment drawings Principles of mechanical, structural and electrical engineering Concepts in mathematics pertinent to manufacturing-related engineering calculations Methods of determining manufacturing equipment interactions with other systems in a facility 	<ul style="list-style-type: none"> Methods of translating high complexity project requirements into two-dimensional (2D) and three-dimensional (3D) electrical drawings Advanced principles of mechanical, structural and electrical engineering International best standards and guidelines related to engineering drawing Methods of evaluating drawing techniques 		
Abilities	<ul style="list-style-type: none"> Understand how technical drawings are used in engineering and maintenance activities Understand basic technical drawings Interpret a technical drawing to guide own work 	<ul style="list-style-type: none"> Interpret basic technical drawings Operate CAD software to modify existing drawings Apply geometric dimensions and tolerances in engineering drawings 	<ul style="list-style-type: none"> Apply mechanical, electrical and structural principles to installation specifications Create full scale technical drawings using appropriate 2D or 3D methods Conduct engineering calculations to verify 	<ul style="list-style-type: none"> Create new, large scale and high complexity technical drawings using appropriate 2D or 3D methods Review drawings against regulations, guidelines conventions and project requirements 		

**SKILLS FRAMEWORK FOR BIOPHARMACEUTICALS MANUFACTURING
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE DOCUMENT**

		<ul style="list-style-type: none"> • Perform basic engineering calculations • Differentiate between specifications of various manufacturing equipment and systems • Suggest improvements to engineering drawings 	<p>technical details and specifications</p> <ul style="list-style-type: none"> • Incorporate details of appropriate materials for a project in drawings • Incorporate provisions for synchronising with other manufacturing equipment • Represent interdependence with other systems 	<ul style="list-style-type: none"> • Evaluate adherence of drawings to relevant regulations and guidelines • Develop more efficient methods of creating equipment drawings based on complexity, cost and time involvement 		
--	--	---	---	---	--	--