



Subsea Engineering Competency Profile

EXTERNAL CORROSION AND CONTROL ELECTIVE

MC-003

The competency demonstrates the subsea engineer has sufficient knowledge to critically review or perform (under supervision) the engineering and management of factors affecting external corrosion and its control in a subsea environment.

ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT
<p>Working knowledge of the external corrosion mechanisms:</p> <ul style="list-style-type: none"> • General Corrosion • Galvanic corrosion between different metals • Microbially induced corrosion 	<p>Understands;</p> <ul style="list-style-type: none"> • the causes of corrosion and the fundamental way in which metals corrode • the impact of bacteria and how the by-products affect steel • galvanic principles and how to identify and mitigate galvanic couples 	<p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p> <p>Understands the corrosion mechanisms, the relationship between different metals when coupled together and the potential issues relating to microbial activity resulting in corrosion of steel in seawater and in the seabed.</p>
<p>Working knowledge of the corrosion control measures:</p> <ul style="list-style-type: none"> • Corrosion control by coatings • Application of cathodic protection and it's limitations 	<p>Can identify, assess and mitigate galvanic couples.</p> <p>Can identify limitations in spread of cathodic protection due to attenuation on pipelines, requirement for coatings to extend the spread of protection, and limitations in the ability for anodes to deliver current to large bare structures.</p>	<p>Has been involved in the review and selection and / or specification of coating system in combination with cathodic protection and other forms of corrosion control measures applicable to offshore structures.</p>
<p>Working knowledge of coating systems:</p> <ul style="list-style-type: none"> • Coating system for pipelines • Coating systems for field joint coatings • Coating systems for subsea structures • Insulation coatings and their characteristics • Impact of atmospheric zones 	<p>Understands the types of coatings and their limitations.</p> <p>Can select coatings with consideration to service conditions and the suitability / limitations for various coatings.</p>	<p>Has been involved in the review and selection of coating systems on subsea structures including factory applied pipeline coatings, field joint coatings and coating on offshore structures. Shown to be able to identify suitable coating systems for each application, generic coating system for various applications and</p>



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		<p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p> <p>coating repair / field joint types as well as requirements for insulated pipelines.</p>
<p>Working knowledge of Cathodic Protection systems:</p> <ul style="list-style-type: none"> ● Understanding of the factors affecting cathodic protection current requirement ● Impact of operating temperature ● Impact of water depth ● anode geometry and its effect on anode life ● anode composition and impact on design life ● Importance of electrical continuity or discontinuity ● Effect of shielding of CP system (under coatings, J tubes etc) ● Interference between adjacent CP systems ● Adverse effects of cathodic protection and over-protection on particular grades of steel 	<p>Can identify the suitability of cathodic protection systems, accounting for anode size, spacing, separations, and how these relate to anode depletion.</p> <p>Can recognise limitations of CP and specify alternative mitigation measures.</p> <p>Understands the limitation of protection within a pipe or similar, and the importance of electrical continuity throughout a structure.</p> <p>Understands how the guidance notes are interpreted in codes and standards, rather than just taking formulas and applying them.</p>	<p>Has defined, reviewed or approved a cathodic protection system on at least three projects.</p> <p>Can describe some instances of CP malfunction, elaborate on root causes and remediation applied.</p>
<p>Working knowledge of subsea inspection and assessment techniques:</p> <ul style="list-style-type: none"> ● Basic inspection techniques ● Inspection requirements for pipelines and flowlines ● Inspection requirements for structures ● Acceptance criteria for CP ● Validating CP measurements ● Equipment installation and layout 	<p>Able to identify correct inspection techniques applicable to various subsea structures, including correctly specifying what measurements are relevant for each technique, what alternate techniques may be applicable and the limitations of each technique.</p> <p>Able to identify important parameters and equipment mobilisation requirements to ensure valid data is recorded such as deployment of remote reference cells for proximity measurements.</p>	<p>Has performed or interpreted results from subsea CP inspections on at least two projects.</p>



ENGINEERS
AUSTRALIA

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	Understands the importance of connecting to structure for CP readings and having remote reference cells for pipeline survey.	
Working knowledge of how CP system and coating selection design impacts bioaccumulation, external calcite deposition and/or under deposit corrosion.	Able to recognise the impact of this in Australian waters	Can identify at least three areas where this has occurred.