



Subsea Engineering Competency

MATERIALS SELECTION AND ENGINEERING ELECTIVE

MC-004

This competency demonstrates the subsea engineer has sufficient knowledge to critically review or perform (under supervision) materials selection in the design and operation of subsea facilities.

ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT
<p>Working knowledge of materials, their typical usage and limitations of application for subsea facilities including:</p> <ul style="list-style-type: none"> • Carbon steel, • Corrosion resistant alloys (solid & clad/lined), Exotic metals • Non-metallic materials 	<p>Can:</p> <ul style="list-style-type: none"> • interpret project design requirements in order to influence the selection of materials used in subsea facilities. • justify the requirement for specific coatings / linings and selection of the appropriate materials to meet design requirements whilst optimising costs. • interpret material specifications, material call off sheets, drawings etc. for offshore facilities 	<p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p> <p>Has, for two or more subsea projects in FEED or a later project phase:</p> <ul style="list-style-type: none"> • Contributed to materials engineering and selection studies • Interfaced with materials specialists, specified testing requirements and interpreted results of materials studies
<p>Working knowledge of metallic materials principles and how these apply to subsea equipment, including:</p> <ul style="list-style-type: none"> • Mechanical Design – strength and durability/fatigue, effect of temperature and pressure on material properties. • Materials selection criteria, including qualification and testing. • Fabrication and installation constraints • Weldability of materials • Corrosion Design 	<p>Can:</p> <ul style="list-style-type: none"> • identify material selection drivers and risks related to subsea equipment design, manufacture and operation. • identify items and areas at risk of these mechanisms and estimate the rate or severity of the risk based upon process conditions and design details. 	<p>Has for two or more subsea projects in FEED or a later project phase:</p> <ul style="list-style-type: none"> • responsible for subsea equipment specifications which included materials (metallic & non-metallic) selection /specification • and/or • has verified the materials used in the manufacture of subsea equipment



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ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT
<ul style="list-style-type: none"> ● Erosion Design ● Fracture mechanics ● Materials compatibility ● Preservation ● Inspection, NDT and Failure Analysis ● Ferrous contamination of stainless steels <p>Working knowledge of non-metallic materials principles and how these apply to subsea equipment including:</p> <ul style="list-style-type: none"> ● Mechanical Design – strength and durability/fatigue, effect of temperature and pressure on material properties. ● Materials selection criteria, including qualification and testing ● Joining technologies ● Erosion Design ● Chemical compatibility ● Preservation ● Coating Types, Purpose and Specifications ● Inspection, NDT and Failure Analysis ● Degradation mechanisms of non-metallic materials 	<ul style="list-style-type: none"> ● identify appropriate design or operation features to mitigate these risks, as part of a facility design or otherwise. ● identify outcomes resulting from the use of various materials, in their respective service environments, over the lifecycle of the parent equipment. ● contribute to quantitative risk assessment or HAZID hazard identification for material selection risks to a new design or existing facility. ● identify typical material compatibility issues with the fluid composition, temperature and pressure. ● balance the CAPEX and OPEX implications of various material choices to select the optimum materials for subsea equipment design 	<p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p>