



# Subsea Engineering Competency Profile

## MOORING MODELLING AND DESIGN ELECTIVE

**DRM-003**

This competency demonstrates a subsea engineer has expert knowledge of the types of mooring systems and mooring system components, the design basis requirements for mooring system design, physical and analytical modelling of moored structures and the development of design loads and motions for the moored hull form and the mooring system components in both survival and fatigue conditions.

This competency also requires the subsea engineer to have a working knowledge of the design of the riser system, the environmental actions applicable to different floating hull forms, and the degradation mechanisms that may impact on mooring system integrity across the entire mooring system lifecycle.

| ELEMENT OF COMPETENCE   | WHAT THIS COMPETENCE MEANS IN PRACTICE   | INDICATORS OF ATTAINMENT  |
|---|--|---|
| <p>Expert knowledge of:</p> <ul style="list-style-type: none"> <li>the types of mooring systems for different types of floating hull forms</li> <li>mooring system components, including anchoring systems and vessel connections</li> <li>input requirements for mooring system design to cover operations over the entire lifecycle of the mooring</li> </ul> | <p>Capable of:</p> <ul style="list-style-type: none"> <li>Defining the requirements set for mooring system design.</li> <li>Evaluating and determining the key design requirements for a mooring system</li> <li>Defining the interfaces with hull, riser, process and other systems.</li> <li>Identifying and specifying the inspection, maintenance and integrity management requirements of SSCs within the mooring system.</li> <li>Specifying operational requirements of the mooring system under the required operating states and modes</li> </ul> | <p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p> <p>Has experience in at least three of the lifecycle phases of a mooring system.</p> <p>Can describe the key components of a mooring system, key hull and riser interfaces and how the mooring system reacts to their environment.</p> <p>Able to define, develop and specify a set of comprehensive requirements for mooring system design.</p> <p>Able to critically evaluate the risks associated with different mooring system concepts and recommend the preferred mooring system arrangement.</p> <p>Able to critically review the design requirements and supporting data required for the Basis of Design.</p> |



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|--|--|--|
| <p>Working knowledge of:</p> <ul style="list-style-type: none"> <li>● basis of design requirements including relevant standards and Classification requirements</li> <li>● derivation of environmental loads and how they influence different floating hull forms</li> <li>● theoretical foundations of mooring analysis</li> <li>● derivation of design loading and motions for overall system design to meet the system functional requirements</li> <li>● evaluation and interpretation of overall system behaviour</li> <li>● the required control measures at each stage of the mooring system lifecycle that prevent or mitigate threats to mooring system integrity</li> <li>● Mooring installation methodologies and potential threats to integrity arising from them</li> </ul> | <p>Capable of:</p> <ul style="list-style-type: none"> <li>● Interpreting metocean data to fully describe the metocean conditions and directional combinations applicable to the specific mooring system configuration under consideration.</li> <li>● Specifying and reviewing environmental studies, metocean data collection, geotechnical investigations, physical model tests and/or analytical modelling of hull form wind and current loads.</li> <li>● Applying the correct theoretical analysis techniques to the type of assessment being performed.</li> <li>● Performing statistical and extremal analysis to derive design values.</li> <li>● Deriving loads and motions at hull and riser system interfaces.</li> <li>● Understanding particular degradation and/or failure mechanisms and specifying the control measures or mitigations to ensure integrity.</li> </ul> | <p>Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence</p> <ul style="list-style-type: none"> <li>● Able to identify site-specific combinations of metocean parameters influence mooring system design</li> <li>● Able to define the minimum Classification requirements and any additional site/facility specific requirements.</li> <li>● Able to specify the requirements for analytical simulations and physical model testing of the mooring system response under survival, fatigue and operating conditions.</li> <li>● Able to execute and/or review the results of numerical and/or physical simulations of mooring system response</li> <li>● Able to evaluate the overall system performance and dynamic behaviour in different operating modes</li> <li>● Able to derive detailed design loadings for all mooring system equipment and provide detailed design loads and motions at all required hull and riser system interfaces.</li> <li>● Able to identify key threats to mooring system integrity across the entire lifecycle.</li> </ul> |