

Remote Operator Training and Certification Framework

Competency Tables – Management level of responsibility

Remote Operator (M)				
Function: Manage ROC operations				
Column 1	Column 2	Column 3	Column 4	Column 5
Competence	ID Number	KUP	Methods for Demonstrating Competence	Criteria for evaluating competence
1.00 Monitor and control compliance with legislative requirements	1.01	Knowledge and understanding of international and national regulations and guidance, including: .1 certification and documentation requirements for vessels and Remote Operation Centre (ROC) .2 regulatory frameworks governing data communication systems and networks .3 IT, OT and cyber security regulations .4 occupational health and safety regulations and guidance	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Operations are carried out in compliance with international and national regulations and guidance Potential incidents of non-compliance are promptly identified and rectified Procedures designed to safeguard personnel, the ROC and the vessel are followed Knowledge and understanding of hours of work and hours of rest implementation
2.00 Coordinate ROC operations	2.01	Ability to coordinate communications across departments and with external stakeholders	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Communications are consistently clear and successful between the ROC, control positions and to external stakeholders
	2.02	Apply resource management in the ROC, including: .1 planning and coordination .2 personnel assignment .3 time and resource constraints .4 prioritisation of tasks	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Tasks and resources are appropriately allocated throughout operations Tasks are assigned in order of priority

	2.03	Coordinate a risk assessment addressing hazards encountered at a ROC	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator identifies and mitigates hazards that impact personnel, the vessel and ROC infrastructure
3.00 Implement and monitor cyber security arrangements	3.01	Apply industry guidance and best practice to the management of ROC and vessel cyber security	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Industry and technical guidance, pertinent to ROC and vessel cyber security are followed
	3.02	Coordinate risk assessments of ROC and vessel cyber security	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Risk assessments identify and mitigate cyber security hazards impacting ROC and vessel operations
	3.03	Knowledge and understanding of the application of network segmentation of ROC and vessel digital systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The network segmentation of ROC and vessel control systems is correctly mapped The remote operator is able to identify elements of network segmentation that contribute to FMEA
	3.04	Knowledge and understanding of the application of cauterisation procedures of ROC and vessel systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies automated cauterisation functions of a cyber security system The Remote Operator correctly identifies the ROC, network and vessel systems that cauterisation functions impact

	3.05	Knowledge and understanding of the capabilities and limitations of firewalls protecting ROC, network and vessel systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies systems protected by firewalls The Remote Operator applies the correct procedure and FMEA following a cyber security incident where a systems' firewalls are compromised
	3.06	Implement the Company's cyber security policies and management plan, including: .1 the identification, assessment, mitigation and review of risks and vulnerabilities .2 the management of physical access to ROC and vessel IT and OT infrastructure .3 approval processes that govern changes to ROC and vessel control systems .4 access control policies .5 Remote Operator training and familiarisation	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies mitigating measures to limit cyber security vulnerabilities and threats to the ROC and vessel The Remote Operator implements the cyber security plan
	3.07	Knowledge and understanding of cyber security reporting requirements	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies reporting mechanisms regarding cyber security incidents
4.00 Monitor the integrity of the IT and OT infrastructure and coordinate software maintenance	4.01	Thorough knowledge and understanding of ROC and vessel network structures	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly maps the key elements of the ROC and vessel network, including the functions of each key element

	4.02	Coordinate the risk assessing, updating and maintenance of vessel and ROC software, firmware and hardware	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator coordinates ROC and vessel software maintenance in accordance with the SMS Procedures designed for the maintenance and updating of vessel and ROC software are followed Procedures designed for software rollbacks are followed Procedures designed for software version control are followed Procedures designed for the failure or loss of IT /OT systems are followed
	4.03	Adjust digital interfaces in the ROC to ensure optimal configuration for building situational awareness	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Display units are adjusted to enable optimal operating and monitoring conditions
Function: Coordinate connectivity and the sensory interface				
Column 1	Column 2	Column 3	Column 4	Column 5
Competence	ID Number	KUP	Methods for Demonstrating Competence	Criteria for evaluating competence
5.00 Manage sensory systems and interfaces	5.01	Operate and monitor sensory systems and interfaces in the ROC to maintain situational awareness, including: .1 for navigational watchkeeping duties .2 to maintain the vessel's security .3 during emergencies and security incidents	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Sensory systems are operated in accordance with their technical specifications Interfaces are set up and adjusted to ensure that Remote Operator can maintain situational awareness during normal operations and emergencies The Remote Operator ensures that standing orders instruct personnel in the management of digital interfaces
	5.02	Assess the accuracy and reliability of sensors, including: .1 the status of data communication systems and networks, including available bandwidth .2 environmental and meteorological conditions .3 the configuration of the ROC's sensory system interface .4 cyber security systems and procedures	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator promptly identifies: .1 when a sensory system is providing an unreliable output .2 faults in sensory systems .3 hazards in forecasts that are likely to result in the degradation of sensory systems .4 systems that may be impacted during a cyber security incident

	5.03	Prioritise and monitor sensory systems and information under conditions of degraded connectivity	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for the prioritisation of sensory systems are followed Automated functions are monitored during a response to degraded connectivity
	5.04	Knowledge and understanding of the capabilities and limitations of automated sensory systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies the function of a range of automated and autonomous sensory systems The Remote Operator recognises scenarios where automated sensory systems are providing the watchkeeper with scanty information
6.0 Coordinate and monitor connectivity between ROC and vessel	6.01	Monitor compliance with data communication licencing and permit frameworks	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	ROC and vessel operations remain within permit and licencing framework Procedures designed to monitor data communication network licensing and permit limitations are followed The limits to data communication systems are clearly communicated to junior Remote Operators
	6.02	Risk assess and monitor the status of data communication systems, including .1 the prevailing circumstances and conditions .2 the coverage of data communication networks .3 reliability of data communication systems and networks .4 security of data communication systems and networks .5 capabilities and limitations of data communication system and network .6 forecasting models .7 geopolitical factors .8 available and required bandwidth	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Risk assessments mitigate the impacts of varying conditions of connectivity The vessel remains within safe operating limits Procedures designed to prepare a vessel for a degraded condition of connectivity are followed

	6.03	Verify that there is sufficient bandwidth for intended vessel operations and navigation	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Vessel operations and navigation are conducted within safe levels of latency The Remote Operator takes mitigating action when levels of bandwidth are not within safe operating limits Procedures designed for the monitoring of bandwidth and latency are followed
	6.04	Knowledge and understanding of data prioritisation and categorisation procedures, including automated functions	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly identifies data categorisation and prioritisation functions
	6.05	Prioritise vessel functions during conditions of degraded connectivity	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Mitigating actions are taken to prevent hazardous situations during periods of degraded connectivity Remote Operator correctly applies failure modes and procedures during conditions of degraded connectivity
	6.06	Troubleshoot failures in data communication systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Basic data communication system troubleshooting procedures are followed The Remote Operator coordinates troubleshooting and repair work with engineers and technicians
	6.07	Coordinate the changeover between data communication systems and channels	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for the changeover of data communication systems and channels are followed The Remote Operator safely incorporates the scheduling of transferring between systems and channels into planned operations The Remote Operator confirms the availability of data communication systems and frequencies, prior to transfer The Remote Operator identifies when changes to ROC and vessel connectivity are safe

Function: Manage vessel operations and navigation

Column 1	Column 2	Column 3	Column 4	Column 5
Competence	ID Number	KUP	Methods for Demonstrating Competence	Criteria for evaluating competence
7.00 Manage the safe navigation of the vessel	7.01	Coordinate and verify the voyage plan across departments, including: .1 incorporation of the connectivity risk assessment .2 remote control system settings and parameters .3 communication of standing orders across teams .4 contingencies .5 remote pilotage	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Voyage planning procedures are followed The settings and parameters of navigational control systems are appropriately set, monitored, updated and approved appropriate to the prevailing circumstances and conditions Procedures designed for the operation and monitoring of navigational control system settings and parameters are followed Contingencies are implemented as required by the voyage plan The Remote Operator prepares standing orders to be followed by navigational watchkeepers
	7.02	Conduct vessel manoeuvres, including: .1 berthing operations .2 pilotage .3 MOB/Person in distress .4 during conditions of degraded connectivity	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Vessel manoeuvres result in the vessel passing vessels and obstacles at a safe distance Pilotage and berthing procedures are followed
	7.03	Apply information obtained from sensors during manoeuvres, including: .1 the information available from inertial sensors .2 response to helm orders .3 rate of turn .4 list and trim sensors .5 heeling sensors .6 speed .7 distances to navigational hazards	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Vessel manoeuvres result in the vessel's motion remaining within safe limits

8.00 Coordinate vessel operations	8.01	Set up, adjust and monitor control system settings and parameters	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Control systems are set up, adjusted and monitored in accordance with technical specifications, industry guidance and regulatory requirements
	8.02	Knowledge and understanding of human-machine teaming, including: .1 system capabilities and limitations of autonomous systems .2 the use of digital interfaces to maintain situational awareness .3 levels of autonomy and transition control .4 decision support systems .5 ethical implications of automation and autonomy .6 legal accountability with regards to automation	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Human factors are taking into consideration during the management decision-making process Autonomous and automated systems are correctly applied to the operational context
	8.03	Take action upon detecting that an autonomous or automated control systems have exceeded safe limits and require intervention	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Instances where automated or autonomous control systems require intervention are recognised and action is taken to ensure the vessel remains within safe operating limits
	8.04	Coordinate mooring operations, including: .1 considerations for manoeuvring by remote control during berthing operations .2 coordination with local authorities, shoreside personnel, tugs and VTS .3 communications with mooring teams located at the berth	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for mooring operations are followed Safe working practices and company procedures are followed Communications with mooring teams are consistently clear and successful

	8.05	Coordinate the transfer of control, including: .1 between control positions .2 between ROCs .3 between the primary and back-up ROC	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator schedules the transfer of control between control positions /ROCS The Remote Operator prepares their team in the case that a loss of control is experienced during transfer The Remote Operator prepares their team to perform duties as a back-up ROC The Remote Operator correctly explains the requirements of a back-up ROC
Function: Coordinate the response to system failures, emergencies and security incidents				
Column 1	Column 2	Column 3	Column 4	Column 5
Competence	ID Number	KUP	Methods for Demonstrating Competence	Criteria for evaluating competence
9.00 Coordinate the response to failures of ROC and vessel systems	9.01	Knowledge and understanding of automated responses to failures in ROC and vessel systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Automated functions during failures of systems are correctly identified and verified
	9.02	Apply Failure Mode Effect Analysis (FMEA) during failures of ROC and vessels systems and equipment	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for the failure of ROC and vessel systems and equipment are followed FMEA is correctly followed, and mitigating actions are taking to prevent the vessel entering into hazardous situations
	9.04	Coordinate the response to failures of vessel systems and equipment, including: .1 data communications systems .2 sensors .3 radio communications .4 steering and propulsion systems .5 electronic navigational equipment .6 IT/OT systems .7 power plant and auxiliaries	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for the failure of vessel systems are followed Actions taken during failures of systems and equipment minimise the risk to life, the vessel and the environment Alarms are consistently and correctly identified and appropriate mitigating action is taken The Remote Operator explains the contingencies to regain connectivity between ROC and vessel Procedures designed to regain connectivity are followed The Remote Operator coordinates the response to vessel failures and communicates the status of the vessel to engineers, technicians and support teams

	9.05	Coordinate the response to failures of ROC systems and equipment, including: .1 IT/OT systems .2 power supplies and ancillary systems .3 data communications systems .4 control systems .5 data communications equipment	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training .4 approved training programme .5 examination	Procedures designed for the failure of ROC systems are followed Actions taken during failures of systems and equipment minimise the risk to life, the vessel and the environment Alarms are consistently and correctly identified and appropriate mitigating action is taken The Remote Operator coordinates the response to ROC failures and communicates the status of the ROC and vessel to back-up ROCs.
10.00 Coordinate emergency response	10.01	Knowledge and understanding of how security arrangements are applied to ROC and vessels	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	The Remote Operator correctly explains how security arrangements and procedures are correctly implemented and followed The Remote Operator correctly explains the systems in place to prevent unauthorised access to onboard systems
	10.02	Coordinate the response to ROC security incidents, including: .1 physical attack on the ROC, ancillary equipment or associated facilities .2 bomb threat .3 cyber security incident .4 physical trespass .5 civil unrest .6 any other incident requiring evacuation from the control position or ROC	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for responding to ROC security incidents are followed Actions taken during emergencies minimise the risk to life, the vessel and the environment The Remote Operator demonstrates an ability to safely coordinate their team's response to a ROC security incident Emergency services are promptly informed of the security incidents and status of the ROC
	10.03	Coordinate the response to security incidents at the vessel, including: .1 piracy .2 cyber security incidents .3 bomb threat .4 stowaways .5 spoofing and jamming of vessel systems	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for responding to vessel security incidents are followed Actions taken during emergencies minimise the risk to life, the vessel and the environment

	10.04	Coordinate the response to emergencies at the ROC, including: .1 fire .2 loss of control .3 medical emergency .4 any other incident that requires evacuation from the ROC or control position	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for responding to emergencies at the ROC are followed Actions taken during emergencies minimise the risk to life, the vessel and the environment
	10.05	Coordinate the response to emergencies at the vessel, including: .1 loss of control .2 fire .3 flooding/grounding .4 MOB / person in distress .5 collision or allision .6 pollution incident	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for responding to emergencies on the vessel are followed Actions taken during emergencies minimise the risk to life, the vessel and the environment
	10.07	Coordinate the physical recovery of the vessel, following a sustained loss of control or connectivity	Examination and assessment of evidence obtained from one or more of the following: .1 approved training programme .2 approved simulator training .3 approved practical training .4 examination	Procedures designed for the recovery of the vessel are followed