

Prevention/Integrity Measures (PR)

SCE Description	PR-04 - TOPSIDES STRUCTURAL INTEGRITY	PERFORMANCE STANDARDS	SCE Custodian	STRUCTURAL
SAFETY CRITICAL ELEMENT	Topsides Structural Integrity			
OBJECTIVE(S)	<ul style="list-style-type: none"> - To provide structural support and maintain the structural integrity of Process, Utility and E-House modules, piperacks and Flare/ Vent Tower. - To maintain structure function during hydrocarbon releases, fires, explosions, impact and other design accidental events for sufficient time to allow evacuation. - To ensure structural integrity during operations on site for stipulated period of extreme environmental events and fatigue over stipulated design life. 			
SCOPE / BOUNDARY LIMIT	<p>The following are included in this SCE:</p> <p>Process, Utility and E-House modules including module stools, riser porch modules when applicable, piperacks and flare/ vent tower primary structure.</p> <p>Note: Integrity criteria of buildings where SCB are located inside are captured in the respective SCBs performance standards. E.g.</p> <ul style="list-style-type: none"> - Forward Shelter is covered in ER-06 Forward Shelter. - Emergency Generator Room is covered in ER-03 Emergency Power. - Forward Fire Pump Room is covered in MI-02 Active Fire Protection – Firewater, Deluge and Foam - Pedestal Cranes are covered in PR-05 Cranes & Lifting Appliances 			
SYSTEM DESCRIPTION	[To be filled in when developing project specific EATS and OATS]			
RELEVANT MAH	<p>MAH-01b(S): Hydrocarbons risers / Loss of containment in riser balcony</p> <p>MAH-02b: Hydrocarbon production / Loss of containment in production module topside</p> <p>MAH-03a: Fuel gas supplies / Loss of containment in open areas outside production modules</p> <p>MAH-03b: Fuel gas supplies / Loss of containment in engine room</p> <p>MAH-04a: Cargo storage & offloading / Loss of containment over cargo storage area</p> <p>MAH-04c: Cargo storage & offloading / Loss of containment at cargo metering package</p> <p>MAH-05a: Toxic gas / Loss of containment topside</p> <p>MAH-06a: Non-process flammable hazards / Loss of containment of flammable chemical</p> <p>MAH-06b: Non-process flammable hazards / Loss of containment of helifuel</p> <p>MAH-09b: Structures under loading / Flare tower collapse</p>			

UNCONTROLLED WHEN PRINTED

Prepared: Sagishima Yuka 2020/07/15 Approved: Tsubokawa Takehiko 2020/07/15



SCE Description	PR-04 - TOPSIDES STRUCTURAL INTEGRITY	PERFORMANCE STANDARDS	SCE Custodian	STRUCTURAL
INTERDEPENDENCY				
SCE		Relationship		
<ul style="list-style-type: none"> - PR-01 (Hull Structural Integrity) - PR-08 (HC containment - process/utilities) - DC-02 (Flare system) - DC-04 (ESD System) - DC-05 (Blowdown system) - DC-06 (Bundling & open hazardous drains) - MI-01 (PFP) - MI-02 (AFP - firewater, deluge & foam) - MI-05 (Dropped object protection) - ER-02 (Escape & evacuation routes) - ER-04 (Emergency escape lighting) 		<ul style="list-style-type: none"> - Hull provides the structural base for Topside and Utility modules/ structures - Topsides structure supports the Process and Utility systems' integrity - Topsides structure supports the flare headers integrity - Topside structure provides support for shutdown system equipment - Topside structure provides support for blowdown system equipment - Topside structure provides support for bundling & drains pipework above main deck - PFP applied to structural steelwork as required where risks from failure and escalation are unacceptably high - AFP mitigates jet and pool fires - Dropped object protection ensures structural, equipment and pipework integrity in areas of dropped object risk - Topsides structure supports escape routes to main deck - Emergency escape lighting is provided on the topsides structure 		

SCE Description	PR-04 - TOPSIDES STRUCTURAL INTEGRITY	PERFORMANCE STANDARDS	SCE Custodian	STRUCTURAL				
FUNCTIONAL SPECIFICATION				Applicable Verification Phase				
Statement	Criteria No.	Criteria	D	P	C	Cm	O	
Structural supports to maintain structural integrity	PR-04-01	Topsides structures shall maintain structural integrity due to vessel motion, environmental, and operational loads throughout the project-defined field life in accordance with appropriate class and codes/ standards.	√	√				
Structural supports to maintain structural integrity	PR-04-02	Topsides Structures interface with module support and Flare/Vent Tower shall have a fatigue design factor of 3 times the field life.	√					
Provision of corrosion protection on topsides structures	PR-04-03	Topsides structures shall be designed with corrosion control for the design life of the FPSO to prevent loss of strength and changes in fatigue resistance.	√					

UNCONTROLLED WHEN PRINTED





SCE Description	PR-06 - NAVIGATIONAL AIDS AND COLLISION AVOIDANCE	PERFORMANCE STANDARDS	SCE Custodian	TELECOM
SAFETY CRITICAL ELEMENT	Navigational Aids and Collision Avoidance			
OBJECTIVE(S)	<ul style="list-style-type: none"> - To indicate the presence of vessels which may pose a collision risk - To provide warning to marine vessels of the FPSO's location to allow safe navigation and prevent impacts - To provide indication of aeronautical obstructions to prevent helicopter impacts 			
SCOPE / BOUNDARY LIMIT	<p>The following are included in this SCE:</p> <ul style="list-style-type: none"> - Maritime Light Signals, Fog Signals, Aeronautical Obstruction Lighting, Collision avoidance radar and plotting aids (ARPA), RACON, AIS and EMMS. <p>Note: Refer to ER-11 Helicopter Facility for helideck lighting.</p>			
SYSTEM DESCRIPTION	[To be filled in when developing project specific EATS and OATS]			
RELEVANT MAH	MAH-07a: Vessel movements / Ship collision MAH-07b: Vessel movements / Loss of position MAH-08a: Transportation / Helicopter crash			
INTERDEPENDENCY				
SCE		Relationship		
<ul style="list-style-type: none"> - PR-01 (Hull Structural Integrity) - PR-02 (Mooring system integrity) - PR-05 (Cranes and Lifting Appliances) - DC-07 (Ignition Control) - ER-03 (Emergency Power) - ER-11 (Helicopter Facility) 		<ul style="list-style-type: none"> - Nav. aids & collision avoidance to prevent ship collision to hull structure - Nav. aids & collision avoidance to prevent ship collision to mooring - Aircraft warning lights will be installed on crane booms - Nav aids and collisions avoidance equipment to be suitably rated for the location of operation - Emergency power is provided to the nav aids and collisions avoidance equipment following loss of main power - Nav aids & aircraft warning lights at helideck 		

UNCONTROLLED WHEN PRINTED

Prepared: Sagishima Yuka 2020/07/15 Approved: Tsubokawa Takehiko 2020/07/15



SCE Description		PR-06 - NAVIGATIONAL AIDS AND COLLISION AVOIDANCE	PERFORMANCE STANDARDS	SCE Custodian			TELECOM	
FUNCTIONAL SPECIFICATION				Applicable Verification Phase				
Statement	Criteria No.	Criteria	D	P	C	Cm	O	
Alerts marine vessels	PR-06-01	Navigational aids (flashing lights and foghorn) shall be provided on the FPSO in accordance with IALA to alert marine vessels of the position of the FPSO.	√	√		√		
Alerts marine vessels	PR-06-02	An Automatic Identification System (AIS) shall be provided on the FPSO to automatically provide information to other appropriately equipped ship or aircraft.	√			√		
Alert FPSO of approaching vessel	PR-06-03	An automatic radar and plotting aids (ARPA) shall be installed on the FPSO. The radar shall be provided with multiple range settings with a min coverage >20 nm. X and S band marine radar systems to monitor marine activity, including the approach of shuttle tankers, and fishing and other vessels in the area.	√	√		√		
Alert FPSO of approaching vessel	PR-06-04	The collision avoidance radar and plotting aids (ARPA) system shall be configured so that any vessel entering a pre- defined guard zone will be clearly identified by a relevant symbol and initiate an audible alarm in the CCR.		√				
Alerts aircraft	PR-06-05	Aeronautical obstruction lights shall be provided on the FPSO in accordance with CAP 437 and ICAO requirements to alert aircraft of the position of the FPSO. <i>Performance Standard applicability for project to be checked and accordingly update it as per project specifications</i>	√			√		
Alerts helicopter	PR-06-08	An Environmental & Motion Monitoring System (EMMS) shall be provided on the FPSO to provide information to helicopter pilot prior to landing on FPSO.	√			√		

UNCONTROLLED WHEN PRINTED

Prepared: Sagishima Yuka 2020/07/15 Approved: Tsubokawa Takehiko 2020/07/15

