Cofferdam Formal Work Package Requirements

ASHORE and AFLOAT Responsibilities and Approval Authorities

Instructions

1. The Formal Work Package (FWP) must be developed by the assigned contractor. MSC N7 maintains an IDIQ Underwater Hull Cleaning Contract.

2. The Principal Port Engineer (PPE) is to liaise with the underwater-husbandry contractor, to provide required drawings, information, and details as needed for FWP development.

3. The “Responsible” party as dictated in the third column of this checklist denotes the party responsible for validating the requirement exists in the FWP and is technically satisfactory.

4. Each item reviewed must receive an initial in the “Approved” / “Not Approved” column. Rows that may not be applicable to the repair must be annotated with “N/A” or “Not Applicable.”

5. Reference 5.3, as used in this checklist, refers to reference 5.3 in SMS procedure 10.7-002-ALL “Cofferdam and Freeboard requirements for Ship Repairs.” Reference 5.3 in SMS procedure 10.7-002-ALL is the “Underwater Ship Husbandry Manual.”

6. If there is any Criteria that the ship is responsible for approving that the ship is not confident in approving, the ship should forward the request for approval to MSC N721 Naval Architecture Department.

Criteria	Specific Requirement	Responsible	Approved	Not Approved
1. Administrative Controls				
1.1 Ship's Name		Ship's Force		
1.2 Ship's Hull Number		Ship's Force		
1.3 Contractor's Name		Ship's Force		
1.4 Contractor's Address		Ship's Force		
1.5 Work Item and Paragraph		Ship's Force		
1.6 FWP Title		Ship's Force		
1.7 FWP Number with Revision		Ship's Force		
1.8 Date of FWP Development		Ship's Force		
1.9 FWP Submission Date		Ship's Force		
1.10 FWP Creator's Name		Ship's Force		
1.11 Approval Signatures	SMS Form 10.7-002-02-ALL	Ship's Force		
2. Purpose / Scope				
2.1 Describe the Process and: (a) Type of Cofferdam Used (b) Affected Hull Opening (c) Affected Equipment / System		Ship's Force		
3. Personnel Qualifications				

3.1 Diver Training Plan. Note: the Diving Contractor's Training Plan & documentation complies with reference 5.3, 16-10.2.1 & 16-10.2.2	Reference 5.3 16-10.2.1 16-10.2.2 16-10.2.4 16-10.2.4.1 16-10.2.4.2 16-10.2.4.3	Ship's Force		
3.2 Diver Competency. Note the Divers: (a) Are ADCI recognized with 7 years (min) commercial diving experience (b) Have current medical physical screening (c) Have current CPR and First Aid Certification (d) Have Cofferdam Program Certification (e) Have performed six (6) (min) cofferdam installations (f) Have performed a cofferdam installation within the last six (6) months	Reference 5.3 16-1.6 16-10.2.3.3.1 16-10.2.3.3.2 16-10.2.4.2.5 16-10.2.4.2.8	Ship's Force		
3.2.1 Minimum diver cofferdam training requirements. Require the completion of reference 5.3, Appendix E demonstrating diver fundamental cofferdam knowledge.	Reference 5.3 16-5.2.20 16-10.2.2 16-10.2.3.3.4 Appendix E	Ship's Force		
3.3 Engineering. Specific NON-standard cofferdam(s) were designed by a degreed Engineer or Professional Engineer.	Reference 5.3 16-3.11 16-10.2.3.1	N72 Technical		
3.4 Fabrication Personnel. Note contractor welders are qualified to company's approved welding procedure(s).	Reference 5.3 16-10.2.3.2 16-10.2.4.3	N72 Technical		
4. Safety Guidelines				
4.1 Personnel protective gear. Note the minimum required PPE will be used.		Ship's Force		

4.2 Emergency Flooding Plan. Whenever single-valve protection is in place, include in the written notification to the ship a specific plan for immediate installation of a replacement piping component or internal sealing blank. Provide a note indicating that ship's force is responsible for developing an on-site emergency flooding plan (dewatering response), which includes additional emergency dewatering equipment that must be operationally ready before commencing work and available for the entire time single-valve protection is in place.	Reference 5.3 16-4.7.1.5 16-5.2.10 16-7.6.5 16-10.2.6 16-10.2.6.9	Ship's Force		
4.3 Joint Safety Brief. Note participation in a pre-job Joint Safety Brief, if contractor attendance is required.		Ship's Force		
4.4 Posted safety precautions. Warning signs. Specify and describe each of the following (figure, sketch, etc)		Ship's Force		
4.4.1 Warning sign posted at quarter deck to space that contains the systems impacted by the FWP.		Ship's Force		
4.4.2 Warning sign posted at the entrance(s) to the space that contains the systems impacted by the FWP.		Ship's Force		
4.4.3 Warning sign posted at the seawater supply manifold (eductor) if applicable.		Ship's Force		
4.4.4 Warning sign at the deck edge in way of cofferdam support rigging if applicable.		Ship's Force		
5. Cofferdam and Internal Blank Design				
5.3 Cofferdam Design. Specify a suitable capacity cofferdam, including:	Reference 5.3 16-3.7 16-3.8 16-10.2.4.5 1-7 Appendix C	N72 Technical		

5.3.1 Supporting Documentation. Require design and maintenance records that comply with Reference 5.3, Paragraph 16-5.2.7 (patches), or 16-6.6.4 (dry-chambers), or 16-7.6.3 (stern tube seals), including as necessary: (a) Fabrication Drawings (b) Inspections (c) Engineering Calculations (d) Cofferdam rated depth (e) Maximum hull opening size (f) Gasket requirements (g) Eductor and vent line requirements (h) Patch specific hull opening (i) Attachment and alignment procedures (j) Maintenance records Note: (1) NAVSEA approved designs require calculations if the material is aluminum due to the change in requirements from the 2015 aluminum design standard to the 2020 aluminum design standard. (2) Commercially procured plugs from an approved manufacturer do not require a design sketch.	Reference 5.3 16-3.7 16-5.2.7 16-5.2.8 16-6.6.4 16-6.7.4 16-7.6.3 16-10.2.4.5	N72 Technical		
5.3.2 Identification. Require an installation data plate or engraved (or welded) serial number on cofferdams, corresponding to supporting documentation.	Reference 5.3 16-5.2.7 16-6.6.4 16-10.2.4.5	Ship's Force		
5.3.3 Templating. Note the cofferdam is contoured to fit the hull curvature as necessary.	Reference 5.3 16-2.1.2.2 16-2.1.2.3 16-3.10 16-5.3.3 16-6.7.3 16-7.7.3 16-8.1 16-8.2 Appendix C	N72 Technical		

5.3.4 Overall Dimensions. Specify the gross dimensions of the cofferdam.	Reference 5.3 16-10.2.4.5 16-3.8	N72 Technical		
5.3.5 Material Types and Thicknesses. Specify the appropriate material types and thicknesses conforming to Reference 5.3, Section 9.	Reference 5.3 16-3.8 16-10.2.4.5	N72 Technical		
5.3.6 Stiffeners. Specify the size and spacing of stiffeners, if applicable.	Reference 5.3 16-2.1.2.2 16-3.8 16-5.3.1 16-6.2 16-9.1.1.2 16-9.2.3.7 16-9.5.4	N72 Technical		
5.3.7 Eductor, Air Supply and Vent. Specify: (a) As necessary, attachment locations of the eductor, air supply and vent, including suction side closure valves. Note: All patch pipe nipples used to attach external vent lines must have valves installed to secure the space when dewatering is complete. (b) As necessary, size and type of eductor, air supply and vent. Note: External vent lines must be non-collapsible hoses. (c) As necessary, that the cofferdam must be vented to atmosphere by an internal vent or an external non-collapsible vent line. Note: When using an internal vent, communications must be established between topside and internal space workers to ensure that the internal vent valve is open prior to eductor operation. (d) As necessary, that a vent line (internal or external) must be installed and opened before dewatering to prevent a vacuum and overloading the patch. (e) As necessary, a caution tag on all internal vents stating: “EXTERNAL	Reference 5.3 16-3.8 16-3.9 16-5.2.2 16-5.2.14 16-5.3.4 16-6.7.5 Appendix A	N72 Technical		

COFFERDAM VENT VALVE. IF WATER PRESENT OR PRESSURIZED AIR RELEASED WHEN OPENED, TAKE ACTION TO CONFIRM COFFERDAM ADEQUACY."				
5.3.8 Gasket Design. Require gasket to be fabricated from ASTM D 1056-00 Type 2, Class B or C, Grade 1 or 2 closed cell foam and a minimum of 3 inches in width (complying with Reference 5.3, 16-9.3.1 or 16-9.3.2, as applicable).	Reference 5.3 16-3.8 16-5.2.3 16-9.3.1 16-10.2.4.5 Appendix A	N72 Technical		
5.3.9 Gasket Adhesive. Specify that a marine grade adhesive was used to mount the gasket to the cofferdam flange.	Reference 5.3 16-5.3.1 Appendix A	N72 Technical		
5.3.10 Positive Securing Device Design. Specify the method used to secure the cofferdam to the hull (e.g., J-bolt, hogging lines, etc.)	Reference 5.3 16-3.8 16-3.12 Appendix F	N72 Technical		

5.3.10.1. J-Bolt Minimum Requirements. Refer to, and include, Reference 5.3, Appendix F if a j-bolt is used.	Reference 5.3 16-9.2.3.4 Appendix F	N72 Technical		
5.3.11. Mechanical Fasteners. Specify the fastener type, as necessary.	Reference 5.3 16-3.8 16-9.4	N72 Technical		
5.2. Internal Sealing Blank Design and Documentation. If an internal sealing blank is necessary, require the installation of a less than ½-inch vent valve in the blank and specify: Note: Vent lines must be less than ½" IPS or else a temporary reducer must be installed to make the opening less than ½" IPS.	Reference 5.3 16-3.4.2.1. (2) 16-4.7.1.1 16-4.7.1.2 16-4.7.1.5 16-5.2.1 16-5.2.2 App D: 2, 19	N72 Technical		
5.2.1. Blank conforms to Standard DWG# 845 4612172(latest applicable revision).	Reference 5.3 3.9	N72 Technical		
5.2.2. Gasket conforms to MIL-PRF-1149 (latest revision) or equivalent.		N72 Technical		
5.2.3. Fasteners conform to with MIL-DTL-1222J or equivalent		N72 Technical		
5.2.4. Positive attachment of a Danger Tag.	Reference 5.3 Appendix D	Ship's Force		
5.2.5. Require the blank to be documented on a certified check-off sheet (Reference 5.3, Appendix D) verifying its installation and removal.	Reference 5.3 App D: 2, 19, 22, 23	Ship's Force		

5.3.Rigging Plan. Specify a rigging plan to positively secure the cofferdam to the hull, including, as necessary: (a) Lifting requirements (b) Suitable rigging equipment (e.g., chainfalls, turnbuckles, shackles, bellybands, hogging lines, chafing gear, counterweights) (c) Securing and attachment requirements (e.g., padeye dimensions and locations) and consideration of rigging load requirements, per Reference 5.3, Section 9 (d) Manufacturer and weight testing requirements (Lifting Straps, Padeyes, Wire) (e) Direction and magnitude of expected loads from installation, use, and removal of the cofferdam (f) Rigging points and supporting structure designed with the factors of safety from Reference 5.3, Table 16-6. Note: If rigging to existing ship structure include the following statement: "All existing ship structure selected for rigging purposes, in accordance with this procedure, must be visually inspected, before its use, for any questionable indications that would appear to compromise its strength (e.g., cracks, unintentional holes, severe corrosion) or items or structure that appear insufficient to carry the intended load(s). This authorization is ONLY applicable to the installation and removal of the cofferdam of this procedure." If Contractor personnel are unclear or unsure as to whether an item is acceptable to rig from, contact the SUPERVISOR immediately for clarification / approval.	Reference 5.3 16-3.12 16-5.2.6 16-5.3.4 16-5.3.5 16-6.7.6 16-7.7.5 16-9.2.3.4 16-9.5.2 16-9.5.3 16-10.2.5.2 Appendix B Appendix F	N72 Technical		
5.4 Preparation				

5.4.1. Patch and Plug Inspection. Include Reference 5.3, Appendix C Patch and Plug Inspection Checksheet and require its completion confirming cofferdam inspection.	Reference 5.3 16-3.7.3. (b) 16-3.8. (7) 16-4.7.1.3 16-4.7.1.6 16-5.2.8 16-5.2.11 16-6.6.5 16-6.7.4 16-10.2.4.4 Appendix C	Ship's Force		
5.4.2. Freeboard. Note that watertight integrity of 4-feet (MIN) above the maximum anticipated draft must be maintained.		Ship's Force		
F 5.4.3. Hull Opening or Access Cut Location. To locate cofferdam, specify, as necessary:		Ship's Force		
5.4.3.1. Hull Opening Item #. Referenced on docking drawing.		Ship's Force		
5.4.3.2. Hull Opening Size. Referenced on docking drawing.		Ship's Force		
5.4.3.3. Hull Fairing. Referenced on docking drawing.		Ship's Force		
5.4.3.4. Hull Opening Strainer Bars. Detailed on the seachest drawing and referenced on the piping drawing.		Ship's Force		
5.4.3.5. Access Cut. In lieu of hull opening, detail the location and access cut size.		Ship's Force		
5.4.3.6. Surface Preparation. Inspect and clean hull surfaces to obtain a 100% seal.	Reference 5.3 16-4.8.6 16-4.9.2 16-5.4.2 16-5.2.6 16-6.8.1 16-7.8.1 Appendix C	Ship's Force		
5.4.3.7. Sealing Surface, Hull. A 3-inch minimum sealing surface on the hull around the opening to accommodate the minimum cofferdam gasket width.	Reference 5.3 16-9.3.1. (b) App D: 5	Ship's Force		

5.4.4. Briefing. Specify a method ensuring cognizant personnel must have direct knowledge of the requirements before starting the process.		Ship's Force		
5.4.5. On-site Documentation. Specify that the following on-site documentation must be available for the duration of the process, separately or as part of the PCP. (a) Applicable System Drawings. (b) Approved FWP (c) Reference 5.3 (d) Applicable Standard Forms. Including but not limited to, Reference 5.3, Appendices C, D and G, as necessary (e) Rigging Plan (f) Cofferdam Design Package (g) Emergency Flooding Plan (h) Diving Contractor's Safe Practices Manual (i) Docking Plan Drawing.	Reference 5.3 16-10.2.6	Ship's Force		
5.4.6. FWP Control. Specify a method establishing administrative control of the authorized FWP for the duration of the process, including a record of the data demonstrating satisfactory completion of the procedure. Note: This is normally accomplished by a First-Line Supervisor ensuring all personnel must maintain compliance with FWP requirements.		Ship's Force		
5.4.7. Notifications.				
5.4.7.1. Government. Notify the Ship of the start of the process.		Ship's force		

5.4.7.2. Ship's Force Notification of Cofferdam Installation (Location) and Single Valve Protection. Include, and complete, as required, Reference 5.3, Appendix G Report of Ship's Responsibility for Patch Installation and/or Single Valve Protection confirming the Ship's Master or Designated Representative have been notified and acknowledge the cofferdam's location (if installed) and level of valve protection. Note: Unlike single/double valve protection, weld repairs to the hull do not require App. G as implied by Ref. 5.3, 16-10.2.6.6.	Reference 5.3 16-4.7.1.3 16-4.7.1.4 16-5.2.1 16-5.2.2 16-5.2.9 16-5.2.10 16-6.6.10 16-7.6.5 16-7.6.6 16-10.2.6.6	Ship's force		
5.4.8. Leak Rate. Specify an appropriate leak rate.	Reference 5.3 16-4.7.1.8 16-5.2.17 16-6.6.8 16-7.6.8	Ship's force		
5.4.9. Inspection Dive. Note a pre-installation inspection dive must be accomplished verifying existing conditions.	Reference 5.3 16-3.6 16-7.7.4	Ship's force		
5.4.10. Communications. Specify mandatory two way communication (e.g., hand-held radio, sound powered telephone) between the Contractor (Surveillance Personnel) and Ship's Force (Quarterdeck or Watch Station) for the duration of the process.	Reference 5.3 16-3.4.2.6 16-4.8.4 16-5.2.14 16-5.5.3 16-10.2.5.3 App D: 14, 21	Ship's force		
5.4.11. Dewatering.				

5.4.11.1. Dewatering. If necessary, require installation, tagging (as required) and inspection of all vent lines, eductors and air supply lines (dry chambers), in accordance with Reference 5.3, Appendix D, as necessary.	Reference 5.3 16-5.2.2 16-5.2.14 16-5.2.15 16-5.2.18.1 16-5.2.18.2 16-5.3.4 16-6.6.7 16-6.7.5 16-7.6.6 Appendix D	Ship's force		
5.4.11.2. Pumping, Seawater Supply. If necessary, require maintenance of a seawater supply (supply valve wired open and either a backup fire pump or secondary fire main).		Ship's force		
5.4.12. Operational Compliance Check-List. Include, and complete, the Operational Check-List, Reference 5.3, Table 16-9.	Reference 5.3 16-10.3.1	Ship's force		
5.5. INSTALLATION.				
5.5.3. Installation Checksheet. Include Reference 5.3, Appendix D Patch and Plug Installation Check sheet and complete only those steps pertaining to cofferdam installation.	Reference 5.3 16-3.13 16-4.7.1.3 16-4.7.1.9 16-5.2.11 16-5.2.19 Appendix D	Ship's force		
5.5.2. Verify System and Hull Opening. Verify the removed valve or system corresponds to the system blanked and the hull opening.	Reference 5.3 16-5.4.1	Ship's force		
5.5.3. Locate and Position Cofferdam. Require: (a) Cofferdam to be located in conjunction with the Rigging Plan and Inspection Dive. (b) A 4-foot minimum freeboard (c) A 6-inch minimum clearance between the cofferdam side and hot work area, if applicable. If the 6-inch minimum clearance cannot be maintained provide written justification.	Reference 5.3 3.6 3.12 5.3.5 6.7.6 7.7.5 App C: 1b, 1c App D: 1	Ship's force		

5.5.4. Verify Cofferdam Seal (Watertight Integrity). Require Divers to verify cofferdam's watertight integrity, and, if necessary, retightening of the primary means of cofferdam attachment to establish a watertight seal.	Reference 5.3 Appendix D	Ship's force		
5.5.4.1. Notification of Cofferdam Seal. Require Lead Shop notification that a seal has been established.	Reference 5.3 Appendix D	Ship's force		
5.5.5. Internal Seal Blank. If necessary, require: (a) The installation of an internal seal blank, conforming to the specified design requirements, immediately after removal of the damaged (or repair) component (internal piping or watertight boundary is opened) to maintain double-valve protection. (b) The Contractors to confirm that an internal seal blank with a less than ½" diameter vent valve has been installed immediately after removal of the damaged (or repair) component.	Reference 5.3 16-3.4.2.1.(2) 16-4.7.1.1 16-4.7.1.2 16-4.7.1.5 16-5.2.1 16-5.2.2 App D: 2, 19	Ship's force		
5.5.6. Test & Inspection Plan; Acceptance & Rejection Criteria. Include a Test & Inspection Plan denoting the relevant acceptance and rejection criteria.		Ship's force		
5.5.7. Monitoring. Require cognizant personnel (e.g., Divers or Ship's Force) to monitor watertight integrity of all applicable cofferdams (with dewatering equipment secured) while actually providing single or double-valve protection at intervals no greater than every 7 days for patches and continuously for dry chambers (when occupied). Note 1: The vent valve on internal seal blanks facilitates internal vent cofferdam monitoring. Note 2: The blank vent valve may be left shut when not temporarily opened by the ship's sounding and security detail for patch or plug seal monitoring or, upon approval by the Ship, the blank vent valve may be	Reference 5.3 16-3.4.2.5(4) 16-5.2.2 16-5.2.18 16-6.6.9 16-6.7.2 16-7.7.2 Appendix D: 19 Appendix G	Ship's force		

left continuously open to maintain cofferdam differential pressure.				
5.6.REMOVAL.				
5.6.1. Removal Checklist. Remove cofferdam and complete those remaining steps in Reference 5.3, Appendix D Patch and Plug Installation Checksheet applicable to the removal phase of the cofferdam procedure.	Reference 5.3 16-3.13 16-4.7.1.3 16-4.7.1.9 4.8.1 4.9.7 16-5.2.11 16-5.2.19 5.5 7.9 Appendix D	Ship's force		
5.6.2. Removal/Installation Equipment, On-site. Equipment to move/manipulate the component must be available on-site.		Ship's force		
5.6.3. Cofferdam Seal Verification. Either open the ½-inch vent valve or loosen blank fasteners to slightly spread (open) the seal and verify the cofferdam is holding back sea pressure. If leakage exists correct cofferdam seal.	Reference 5.3 16-4.8.9 16-4.8.10 16-5.5.3 Appendix D	Ship's force		
5.6.4. Internal Sealing Blank. Remove internal sealing blank and retain on-site for immediate installation, if necessary.	Reference 5.3 Appendix D	Ship's force		

5.6.5. Double Valve Protection. Verify reestablishment of double-valve protection after component has been installed and 24-hour surveillance or diver stand by for single-valve protection is no longer required.	Reference 5.3 Appendix D	Ship's force		
5.6.6. Divers Stand-By, Removal. Require Divers to be on stand-by during removal of internal blank and re/installation of component.	Reference 5.3 Appendix D	Ship's force		
5.6.7. Verify System Integrity. Require loosening of cofferdam after the component is installed to verify the flange seal is tight (zero leaks) and, if not, the Divers must retighten the cofferdam to reestablish watertight integrity of the component. When seal is verified, remove the cofferdam.	Reference 5.3 Appendix D	Ship's force		
Note: Non-standard cofferdams are cofferdams other than those provided by Reference 5.3, Section 9.				