NAVSEA
STANDARD ITEM

FY-18

ITEM NO: 009-77
DATE: ***18 NOV 2016***
CATEGORY: ***II***

1. SCOPE:

1.1 Title: Cofferdam ***Installation***; accomplish

2. REFERENCES:

2.1 Standard Items

2.2 S0600-AA-PRO-160/CH-16, Underwater Ship Husbandry Manual, Cofferdams

3. REQUIREMENTS:

3.1 Maintain watertight integrity to a level 4 feet above the maximum calculated draft, including but not limited to the following operations: access openings, hull plating replacement, welding to the hull when pre-heating is required, modifications or repairs to damage or deterioration that will degrade watertight integrity or stability, or piping and mechanical repairs that are expected to result in less than double-valve protection.

3.2 Accomplishment of a Process Control Procedure (PCP) to support installation of a cofferdam (e.g., plug, patch, dry chamber, stern tube seal) shall be in accordance with NAVSEA Standard Items (See Note 4.4) and include the following:

3.2.1 Include the Operational Checklist, Table 16-9 of 2.2, in the PCP.

3.2.2 Prior to the start of the PCP, any time the installed cofferdam will serve as the only barrier to the sea (single valve protection), ensure Ship's Commanding Officer sign-off via the SUPERVISOR, as required by Paragraph 16-4.7.1.4 (plugs), or Paragraph 16-5.2.10 (patches), or Paragraph 16-6.6 (dry chambers), or Paragraph 16-7.6.5 (stern tube seals) of 2.2.

3.2.2.1 The first page of the PCP shall be stamped SINGLE VALVE PROTECTION, at the top, in minimum one-half inch letters.

3.2.2.2 Attachment A shall be used to document single valve isolation signatures.

3.3 Submit one legible copy, in approved transferrable media, of the design and maintenance records in accordance with Paragraph 16-5.2.7 (patches), or Paragraph 16-6.6.4 (dry chambers), or Paragraph 16-7.6.3 (stern tube seals) of 2.2 to the SUPERVISOR.

3.4 Prior to the start of the PCP, submit one legible copy, in approved transferrable media, of Ship's Force notification in accordance with Paragraph 16-4.7.1.3 (plugs), or Paragraph 16-5.2.9 (patches), or Paragraph 16-6.6 (dry chambers), or Paragraphs 16-7.6.5 and 16-7.6.8 (stern tube seals) of 2.2 to the SUPERVISOR.

3.5 Prior to the removal of the cofferdam, submit one legible copy, in approved transferrable media, of Ship’s Force notification in accordance with Paragraph 16-4.7.1.3 (plugs), or Paragraph 16-5.2.9 (patches), or Paragraph 16-6.6 (dry chambers), or Paragraphs 16-7.6.5 and 16.7.6.8 (stern tube seals) of 2.2 to the SUPERVISOR.

(I)(G) “REMOVAL OF COFFERDAM”

3.6 Remove each cofferdam (plug, patch, dry chamber, or stern tube seal) and all associated components upon completion of repairs.

4. NOTES:

4.1 2.2 and associated forms are available at:

http://www.supsalv.org/manuals/uwsh/chap16/chap16.pdf

4.2 Attachment B is provided as an aid to cofferdam PCP development.

4.3 Maximum Calculated Draft (MCD) – The maximum draft, calculated during the period in which ship’s draft is affected due to evolutions which add, remove, or change weight. It represents the “worst case” cumulative effect at any one time on trim, list, or draft for the proposed weight changes throughout the period that hull penetrations are in a non-standard configuration. MCD shall be known and utilized by SUPERVISOR and Ship’s Force in scheduling work and testing during waterborne maintenance periods.

4.4 A PCP to support installation of a cofferdam (e.g., plug, patch, dry chamber, stern tube seal) is required; the use of Category II Standard Item 009-09 “Process Control Procedure (PCP); provide and accomplish” of 2.1 shall be specified in the Work Item.

ATTACHMENT A

AUTHORIZATION FOR SINGLE VALVE ISOLATION

Date_____

Subj: PROVIDE NOTIFICATION OF SINGLE VALVE ISOLATION REQUIREMENT AND PROVIDE PRECAUTIONARY PROCEDURES TO BE EMPLOYED DURING REPAIRS/ALTERATIONS TO SEA-CONNECTED SYSTEMS.

Ref: (a) OPNAVINST 3120.32 Series

1. The procedures involved in this repair/alteration will subject the affected area to a flooding hazard during the time the repair is being accomplished. The purpose of this notification is to outline the responsibilities for precautionary measures placed upon the contractor and the ship while the repairs/alterations are in progress.

2. System: The repairs/alterations to be accomplished to the following system:

   _____Component/Space _____

3. Prior to Commencing work, the contractor shall provide:

   a. A procedure, in accordance with the requirements of NAVSEA Standard Item 009-77, has been developed and approved by the SUPERVISOR (Copy Attached).
   b. The sequence of repairs to be accomplished, including drawings of the system and valve locations. The proposed system isolation must be discussed and mutually agreed upon between the ship, SUPERVISOR, and the contractor.
   c. Identify possible hazards of single valve isolation failure. _____
   d. Expected start _____ and completion _____ for single valve isolation evolution.
   e. Watertight boundaries have been defined, sighted, tagged out and verified. _____

4. During the period of this repair, the following minimum precautions are required:

   a. Ship's Supervisor, E-7 or above, must be present to verify single valve isolation and breaking of pressure boundary.

   b. Ship's Force will provide a watch on the affected system and monitor for leaks, etc.

   c. Ship will maintain appropriate state of damage control readiness.

5. See attached drawing of system and valve locations.

_____ _____ _____

Ship's SRA Coordinator Engineering Officer Commanding Officer/approval

_____

Ship Repair Officer (SRO)/Project Management Officer (PMO) (Notification made to Waterfront Operations Officer)

(Held on site for SBS Review)

ATTACHMENT B
COFFERDAM PCP REVIEW GUIDE
Minimum Requirements and Critical Factors

References

1. NAVSEA STD ITEM 009-01, General Criteria; accomplish
2. NAVSEA STD ITEM 009-09, Process Control Procedure (PCP); provide and accomplish
3. S0600-AA-PRO-160 Underwater Ship Husbandry Manual, Chapter 16 (Appendix C, D, E, F, G; Table 16-9)
4. NAVSEA STD ITEM 009-77, Cofferdam Requirements
5. NAVSEA STD ITEM 009-24, Authorization, Control, Isolation, Blanking and Tagging Requirements; accomplish
6. MIL-STD-777, Schedule of Piping, Valves, Fittings, and Associated Piping Components for Naval Surface Ships or 802-5959353, MIL-STD-777 Modified for DDG-51 Class
7. NAVSEA STD ITEM 009-04, Quality Management System; provide

All cofferdam PCPs shall include the following MINIMUM criteria, including Critical Factors[1], as appropriate, preferably in the order shown below (for further elaboration, see the applicable Reference):

Criteria	Ref	Justification	YES	NO	N/A
1. ADMINISTRATIVE CONTROLS.					
1.1. SHIP'S NAME	1	3.2.4.1			
1.2. SHIP'S HULL NUMBER	1	3.2.4.1			
NUCLEAR VESSEL?					
1.3. CONTRACTOR'S NAME	2 2	3.1.1 Attachment A			
1.4. CONTRACTOR'S ADDRESS	2 2	3.1.1 Attachment A			
1.5. WORK ITEM AND PARAGRAPH	2 1	Attachment A 3.2.4.1			
1.6. PCP TITLE	2 2	3.1.2 Attachment A			
1.7. PCP NUMBER (WITH REVISION)	2 2	3.1.2 Attachment A			
1.8. DATE OF PCP DEVELOPMENT	2 2	3.1.2 Attachment A			
1.9. PCP SUBMISSION DATE	2 2 1	3.1.10 Attachment A 3.2.4.4			
1.10. TITLE OF CONTRACTOR'S REPRESENTATIVE. The individual responsible for creating the PCP.	2 1	3.1.10 3.2.4.4			
1.11. APPROVAL SIGNATURE	2 2	3.1.10 Attachment A			

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Minimum Requirements and Critical Factors

2.	PURPOSE/SCOPE. Describe the process and: (a) Type of cofferdam (b) Affected hull opening (c) Affected equipment/system(s)	2 2 3	3.1.3 Attachment A Appendix C			
3.	PERSONNEL QUALIFICATIONS.	2 2 3	3.1.4 Attachment A 16-10.2.3			
	3.1. Diver Training Plan. Note the Diving Contractor's Training Plan & documentation complies with Reference 3, 16-10.2.1 & 10.2.2.	3 3 3 3 3	16-10.2.1 16-10.2.2 16-10.2.4.1 16-10.2.4.2 16-10.2.4.3			
	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 qualification; (e) Have performed six (6) cofferdam installations; (f) Have performed a cofferdam installation within the past six (6) months.	3 3 3 3 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			
	3.2.1. Minimum Diver Cofferdam Training Requirements. Require the completion of Reference 3, Appendix E demonstrating Diver fundamental cofferdam knowledge.	3 3 3 3	16-5.2.20 16-10.2.2 16-10.2.3.3.4.(c) Appendix E			
	3.3. Engineering. Specify NON-standard cofferdam(s)[2] were designed by a degreed Engineer or Professional Engineer.	3 3	16-3.11 16-10.2.3.1			
	3.4. Fabrication Personnel. Note Contractor Welders are qualified to Company's approved welding procedure.	3 3	16-10.2.3.2 16-10.2.4.3			
4.	SAFETY GUIDELINES.					
CF	4.1. Personnel Protective Gear. Note that the minimum required PPE will be used and provide several examples.	2	Attachment A			
	4.2. Hazardous Materials. Note Hazardous Material Identification and minimization methods comply with NAVSEA STD ITEM 009-03, Toxic and Hazardous Substances; control, as required.	2 2	3.1.9 Attachment A			

ATTACHMENT B
COFFERDAM PCP REVIEW GUIDE
Minimum Requirements and Critical Factors

	4.3.	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 S/F is responsible for developing an on-site Emergency Flooding Plan (dewatering response), which includes additional emergency dewatering equipment that shall be operationally ready before commencing work and available for the entire time single valve protection is in place.	3 3 3 3 3	16-4.7.1.5 16-5.2.10 16-7.6.4 16-10.2.6 16-10.2.6.9			
	4.4.	Joint Safety Brief. Note participation in a pre-job Joint Safety Brief, if Contractor attendance was required.	2	3.4			
CF	4.5.	Posted Safety Precautions – Warning Signs. Specify and describe each of the following (e.g., figure, sketch, etc.):					
		4.5.1. Warning Sign posted at Quarter Deck to space that contains the system impacted by the PCP.					
		4.5.2. Warning Sign posted at entrance to space that contains the system impacted by the PCP.					
		4.5.3. Warning Sign posted at seawater supply manifold (eductor), if applicable.					
		4.5.4. Warning Sign at deck edge in way of cofferdam support rigging, if applicable.					
5.	COFFERDAM AND INTERNAL BLANK DESIGN.		2	3.1.3			

5.1.	Cofferdam Design. Specify a suitable capacity cofferdam, including:	3 3 3 3	16-3.7 16-3.8.(7) 16-10.2.4.5 Appendix C: 1-7			
5.1.1.	Supporting Documentation. Require design and maintenance records that comply with Reference 3, Paras. 16-5.2.7 (patches), or 16-6.6.4 (dry chambers), or 16-7.6.2 (stern tube seals), including, as necessary: (a) Fabrication drawing(s) (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 requirements Note: Commercially procured plugs from an approved manufacturer do not require a design sketch. Cofferdam designs from NAVSEA approved DWGs or Reference 3 do not require engineering calculations.	4 3 3 3 3	3.2.1 16-5.2.7 16-5.2.8 16-6.6.4 16-6.7.4			
5.1.2.	Identification. Require an installed data plate or engraved serial number on cofferdams, corresponding to supporting documentation.	3 3	16-5.2.7 16-6.6.4			
5.1.3.	Templating. Note the cofferdam is contoured to fit the hull curvature, as necessary.	3 3 3 3 3 3 3 3 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			
5.1.4.	Overall Dimensions. Specify the gross dimensions of the cofferdam[3].	3 3	16-10.2.4.5 16-3.8			
5.1.5.	Material Types and Thicknesses. Specify the appropriate material types and thicknesses conforming to Reference 3, Section 9[3].	3 3	16-3.8 16-10.2.4.5			
5.1.6.	Stiffeners. Specify the size and spacing of the stiffeners, as necessary[3].	3 3 3 3 3 3 3	16-2.1.2.2 16-3.8 16-5.1.1 16-6.2 16-9.1.1.2 16-9.2.3.7 16-9.5.4			

	5.1.7.	Eductor, Air Supply and Vent. Specify: (a) As necessary, attachment locations of the eductor, air supply and vent, including suction side closure valves[3]. 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[3]. Note: External vent lines shall be non-collapsible hoses. (c) As necessary, that the cofferdam shall 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 COFFERDAM VENT VALVE. IF WATER PRESENT OR PRESSURIZED AIR RELEASED WHEN OPENED, TAKE ACTION TO CONFIRM COFFERDAM ADEQUACY."	3 3 3 3 3	16-3.8 16-3.9 16-5.2.2 16-5.2.14 16-5.3.4			
	5.1.8.	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 3, 16-9.3.1 or 16-9.3.2, as applicable).	3 3 3	16-3.8 16-9.3.1 16-10.2.4.5			
CF	5.1.9.	Gasket Adhesive. Specify that a marine-grade adhesive was used to mount the gasket to the cofferdam flange.	3	16-5.1.1			
	5.1.10.	Positive Securing Device Design. Specify the method used to secure the cofferdam to the hull (e.g., J-bolt, hogging lines, etc.)	3 3	16-3.8 Appendix F			
		5.1.10.1. J-Bolt Minimum Requirements. Refer to, and include, Reference 3, Appendix F if a j-bolt is used.	3 3	16-9.2.3.4 Appendix F			
	5.1.11.	Mechanical Fasteners. Specify the fastener type, as necessary.	3 3	16-3.8 16-9.4			

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 shall be less than ½" IPS or else a temporary reducer shall be installed to make the opening less than ½" IPS.	3 3 3 3 3 3 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			
	5.2.1. Blank conforms to Standard DWG# 845-4612172(latest applicable revision).	5	3.6.1			
	5.2.2. Gasket conforms to MIL-PRF-1149 (latest revision).	5 6	3.6.1 Cat D-1 & D-3			
	5.2.3. Fasteners conform to with MIL-DTL-1222J.	5 6	3.6.1 4.15			
	5.2.4. Positive attachment of a Danger Tag.	3 5	Appendix D: 19 3.6.1.1			
	5.2.5. Require the blank to be documented on a certified check-off sheet (Reference 3, Appendix D) verifying its installation and removal.	3	App D: 2, 19, 22, 23			
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 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 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, shall 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.	3 3 3 3 3	16-3.12 16-5.2.6 16-9.2.3.4 16-9.5.2 16-10.2.5.2			
5.4.	PREPARATION.					

	5.4.1.	Patch and Plug Inspection. Include Reference 3, Appendix C Patch and Plug Inspection Checksheet and require its completion confirming cofferdam inspection.	3 3 3 3 3 3 3 3 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 Appendix C			
	5.4.2.	Freeboard. Note that watertight integrity of 4-feet (MIN) above the maximum anticipated draft shall be maintained.	4	3.1			
CF	5.4.3.	Hull Opening or Access Cut Location. To locate cofferdam, specify, as necessary:					
		5.4.3.1. Hull Opening Item #. Referenced on docking drawing.					
		5.4.3.2. Hull Opening Size. Referenced on docking drawing.					
		5.4.3.3. Hull Fairing. Referenced on docking drawing.					
		5.4.3.4. Hull Opening Strainer Bars. Detailed on the seachest drawing and referenced on the piping drawing.					
		5.4.3.5. Access Cut. In lieu of hull opening, detail the location and access cut size.					
		5.4.3.6. Surface Preparation. Inspect and clean hull surfaces to obtain a 100% seal.	3 3 3 3 3 3	16-4.8.6 16-4.9.2 16-5.4.2 16-6.8.1 16-7.8.1 Appendix C			
CF		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.	3 3	16-9.3.1.(b) App D: 5			
	5.4.4.	Briefing. Specify a method ensuring cognizant personnel shall have direct knowledge of the requirements before starting the process.	2 2	3.1.7 Attachment A			

5.4.5.	On-site Documentation. Specify that the following on-site documentation shall be available for the duration of the process, separately or as part of the PCP. (a) Applicable System Drawings. (b) Docking Plan Drawing. (c) Approved PCP (d) Reference 3 (e) Applicable Standard Forms. Including but not limited to, Reference 3, Appendices C, D and G, as necessary (f) Rigging Plan (g) Cofferdam Design Package (h) Emergency Flooding Plan (i) Diving Contractor's Safe Practices Manual	2 2 3	3.1.7 Attachment A 16-10.2.6			
5.4.6.	PCP Control. Specify a method establishing administrative control of the authorized PCP 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 shall maintain compliance with PCP requirements.	2 2 2	3.1.8 3.2 Attachment A			
5.4.7.	Notifications.					
	5.4.7.1. Government. Notify the Government (G) of the start of the process, in compliance with Reference 7, Para 3.8.2. Label the notification sign-off as: "(V)(G) START OF PROCEDURE".	2 2 2 7	3.1.11 4.1 Attachment A 3.8.2			

		5.4.7.2. Ship's Force Notification of Cofferdam Installation (Location) and Single Valve Protection. Include, and complete, as required, Reference 3, Appendix G Report of Ship's Responsibility for Patch Installation and/or Single Valve Protection confirming the Ship's C.O. 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. 3, 16-10.2.6.6.	4 4 3 3 3 3 3 3 3 3 3 3 5	3.2.2 3.2.4 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 16-7.6.4 16-7.6.6 16-10.2.6.6 3.1			
	5.4.8.	Leak Rate. Specify an appropriate leak rate.	3 3 3	16-4.7.1.8 16-5.2.17 16-7.6.6			
	5.4.9.	Inspection Dive. Note a pre-installation inspection dive shall be accomplished verifying existing conditions.	3 3	16-3.6 16-7.7.4			
CF	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 OOD Station) for the duration of the process.	3 3 3 3 3 3	16-3.4.2.6 16-4.8.4 16-5.2.14 16-5.5.1 16-10.2.5.1 App D: 14, 21			
CF	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 3, Appendix D, as necessary.	3 3 3 3 3 3 3 3 3 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			
CF		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).					
CF	5.4.12.	Operational Compliance Check-List. Include, and complete, the Operational Check-List, Reference 3, Table 16-9.	4 3	3.2.3 16-10.3.1			

	5.5. INSTALLATION.					
	5.5.1. Installation Checksheet. Include Reference 3, Appendix D Patch and Plug Installation Check sheet and complete only those steps pertaining to cofferdam installation.	3 3 3 3 3 3	16-3.13 16-4.7.1.3 16-4.7.1.9 16-5.2.11 16-5.2.19 Appendix D			
	5.5.2. Verify System and Hull Opening. Verify the removed valve or system corresponds to the system blanked and the hull opening.	3	16-5.4.1			
CF	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 (conforming to GOS, S9AA0-AB-GOS-010, Section 045) (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.	4 3 3 3 3 3 3 3	3.1 3.6 3.12 5.3.5 6.7.6 7.7.5 App C: 1b, 1c App D: 1			
CF	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.	3	Appendix D			
	5.5.4.1. Notification of Cofferdam Seal. Require Lead Shop notification that a seal has been established.	3	Appendix D			
CF	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.	3 3 3 3 3 3 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			

CF	5.5.6.	Test & Inspection Plan; Acceptance & Rejection Criteria. Include a Test & Inspection Plan denoting the relevant acceptance and rejection criteria, in compliance with Reference 7, Paras. 3.4.1 and 3.5.1.	2 2 7 7	3.6.1 Attachment A 3.4.1 3.5.1			
	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 left continuously open to maintain cofferdam differential pressure.	3 3 3 3	16-5.2.2 16-5.2.18 16-6.7.2 Appendix D: 19			
	5.6.	REMOVAL.					
	5.6.1.	Removal Checklist. Remove cofferdam and complete those remaining steps in Reference 3, Appendix D Patch and Plug Installation Checksheet applicable to the removal phase of the cofferdam procedure.	3 3 3 3 3 3 3 3 3 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			
CF	5.6.2.	Removal/Reinstallation Equipment, On-site. Equipment to move/manipulate the component shall be available on-site.					
CF	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.	3 3 3	4.8.9 4.8.10 Appendix D			
CF	5.6.4.	Internal Sealing Blank. Remove internal sealing blank and retain on-site for immediate installation, if necessary.	3	Appendix D			
CF	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.	3	Appendix D			

CF	5.6.6.	Divers Stand-By, Removal. Require Divers to be on stand-by during removal of internal blank and re/installation of component.	3	Appendix D			
CF	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 shall retighten the cofferdam to reestablish watertight integrity of the component. When seal is verified, remove the cofferdam.	3	Appendix D			

Notes.

1. Items referenced to this note are considered “critical factors, which have direct bearing on the process quality and safety” in accordance with Reference 2, Para. 3.1.3 and are either only generally implied in the References or are not readily specified but are nevertheless considered critical and required for a successful cofferdam process. These Items are marked “CF” in this Review form.
2. Non-standard cofferdams are cofferdams other than those provided by Reference 4, Section 9.
3. Can be included as part of design sketch.