

## Appendix B

### INSPECTION, DOCUMENTATION, MAINTENANCE, AND CERTIFICATION OF GRAVING DOCKS

**INTRODUCTION.** Detailed information is given in this appendix for inspecting, reporting, maintaining, and, specifically, certifying graving docks, because this information is no longer covered in a maintenance and operation manual.

**SCHEDULING.** It is not necessary for all parts of a dock to be inspected simultaneously. Each item shall be inspected at least once each year, except for machinery, such as pumps and capstans (see Table B-1 for detailed scheduling). Machinery that must be opened for inspection should be scheduled for inspection at a time when it will not interfere with the docking schedule. Advantage shall be taken of routine pumping and flooding of the dock and caisson to inspect the machinery and equipment while they are in operation.

**DOCUMENTATION.** The following documents shall be made available for study and use by the inspectors:

- (1) Previous reports of preventive maintenance inspections and control inspections.
- (2) Copies of correspondence relative to correction of deficiencies that were initiated or received since the last inspection.

- (3) Copies of correspondence relative to matters affecting the capabilities of the dock or its material readiness.

- (4) Reports of machinery derangements and casualties to material.

- (5) Operational logs, if any, of the dock and its equipment.

- (6) Operation manuals for the equipment.

- (7) A record of repairs or improvements effected on machinery.

- (8) Prints or drawings of the structure and utilities of the dock. Plans and as-built specifications, when available.

Each activity shall prepare a Preventive Maintenance (PM) Manual for the mechanical equipment (pumps, sluice gates, valves, ventilation, etc.) for each graving drydock. The Manual should include but is not limited to the following:

- (1) Location of all fittings.
- (2) Maintenance schedule for components, including description of work
- (3) Overhaul frequency for each piece of equipment (varies between 2 and 10 years)

- (4) Type, age, and manufacturer of installed equipment
- (5) Equipment usage and reliability histories
- (6) Backup equipment available
- (7) Notes on overall condition and impact of failure

**INSPECTION.** Table B-2 lists specific items to inspect. The inspectors shall observe the following procedures when making these inspections.

(1) Thoroughly inspect every part of the drydock and every item of machinery and equipment to determine its condition (see Figure B-1 ).

(2) Make free use of hammers for sounding rivets, bolts, plates, and other parts, and of scrapers for removing paint to disclose metal surfaces. Use probes to determine the soundness of timber structures. Hammers can be used to examine defective areas on concrete surfaces.

(3) Pay particular attention to leaks, and note if any materials are being carried in suspension.

(4) Pay particular attention to the possibility of settlement of the drydock or adjacent land.

(5) Take soundings outboard of entrances to determine whether there are any large holes or raised areas that might indicate movement of earth from or development of water-ways under the drydock floor.

(6) Note any evidence of undue stress in caisson structure, such as sprung plates, leaky rivets, or bent frames, caused by unequal drydock settlement.

If feasible, cracks and other similar faults should be repaired or photographed to determine the rate of

progressive failure.

**MAINTENANCE.** Preventive maintenance is primarily concerned with items that, if disabled, would (1) interfere with an essential operation of the graving drydock, (2) endanger life and/or property, or (3) involve high cost or long lead time for replacement. Maintenance work must be scheduled to conform to the operating schedule of a drydock. Maintenance work which does not interfere with a dock operating schedule should be performed when necessary. The following are the principal elements of maintenance for a graving drydock:

(1) Patching cracks and grouting leaks in the concrete dock body, including filling and discharge culverts; weld repair of metal cracks and damaged metal.

(2) Cleaning, painting, and replacing metal guardrails, stanchions, gratings, and similar equipment.

(3) Repairing and replacing operating equipment (such as motors and controls, pumps, valves, and sluice gates) and utility equipment (such as air, water, steam, electric power, and sewage).

(4) Renewal of blocking.

(5) Cleaning and painting of the drydock entrance closures and seats, and repair and replacement of its operating equipment.

The coating systems recommended for maintenance painting of drydock components are listed in Table B-3. The methods for surface preparation and their application are described in Chapter 7 of this manual and in much greater detail in Reference 7-3 and

B-1. The latter gives detailed instruction for use of MIL-P-24441 listed in Table B-3.

**CERTIFICATION.** The objective of facility certification is to assure the safety of ships and personnel during docking and undocking operations and the safety of ships while in dock. This certification does not cover other requirements of the facility, such as compressed air, steam, electrical, and sewage services. Normally, the facility shall be certified for its maximum designed capacity. If the facility is certified for a loading of less than this amount, the reason for choosing this value shall be explained. The maximum designed capacity, unless otherwise stated, shall be based on a typical ship loading.

When required certification shall be submitted to the major Command with a copy to the appropriate headquarters for each facility every five years. In the event major changes are made to the facility within this five-year period, a revised certification application shall be submitted. As an option, a maintenance program providing for a continuous certification without frequent or regular resubmittals, except when significant changes are made, can be implemented, with the stipulation that:

(1) A formalized and implemented maintenance program exists and can be shown to be effective by audit.

(2) Operating procedures are maintained in current and self-correcting accuracy as shown by in-process audit.

(3) Control of design and other system changes are effected through a formalized and implemented Design (or change) Control Board and

shown to be effective by audit.

Facility certification shall be terminated as a result of the following:

- (1) Major overhaul or repair.
- (2) Broaching of the scope of the facility certification.
- (3) Expiration of tenure of facility certification.
- (4) Recognition of the existence of an unsafe condition.

After certification, the facility must remain in the "as certified" condition with full consideration being given to normal wear and tear for the period of certification.

The general requirements for certification are:

(1) Provide a description of the graving dock. The description must be based on the dock design as presently constructed, including modification to date. Provide data such as core borings and foundation data; description of foundation, longitudinal and transverse sections with appropriate elevations, and entrance closure; information on the performance and adequacy of the drydock pressure relief system; the effectiveness of the drainage features (blankets, filters, and underdrain); and irregularities which may indicate normal concentration of flow or subsurface erosion. Original historical data would only be provided when relevant to the present configuration.

(2) Provide a history of the successful operation of the graving dock over the last five years.

(3) Provide copies of Standard Operating Procedures for Docking and Undocking Vessels and

Standard Operating Procedures for Operating the Graving Docks.

(4) Where activity disaster plans and firemain certification tests have already been submitted, include copies for information only.

(5) An earthquake analysis shall be provided in areas subject to seismic events.

On the basis of the above information, a conditional certification of the facility will be given. Within the next three years, a professional engineer

team must conduct a material survey. The material survey shall include measurements for potential corrosion and cathodic protection. Upon receipt of the survey, the conditional acceptance will be made a full acceptance.

A material survey by an independent team shall be conducted at ten-year intervals. A yearly visual survey of each facility must be conducted by in-house personnel and a report submitted. If any material change occurs to the condition of the facility, the activity must notify the certification organization.

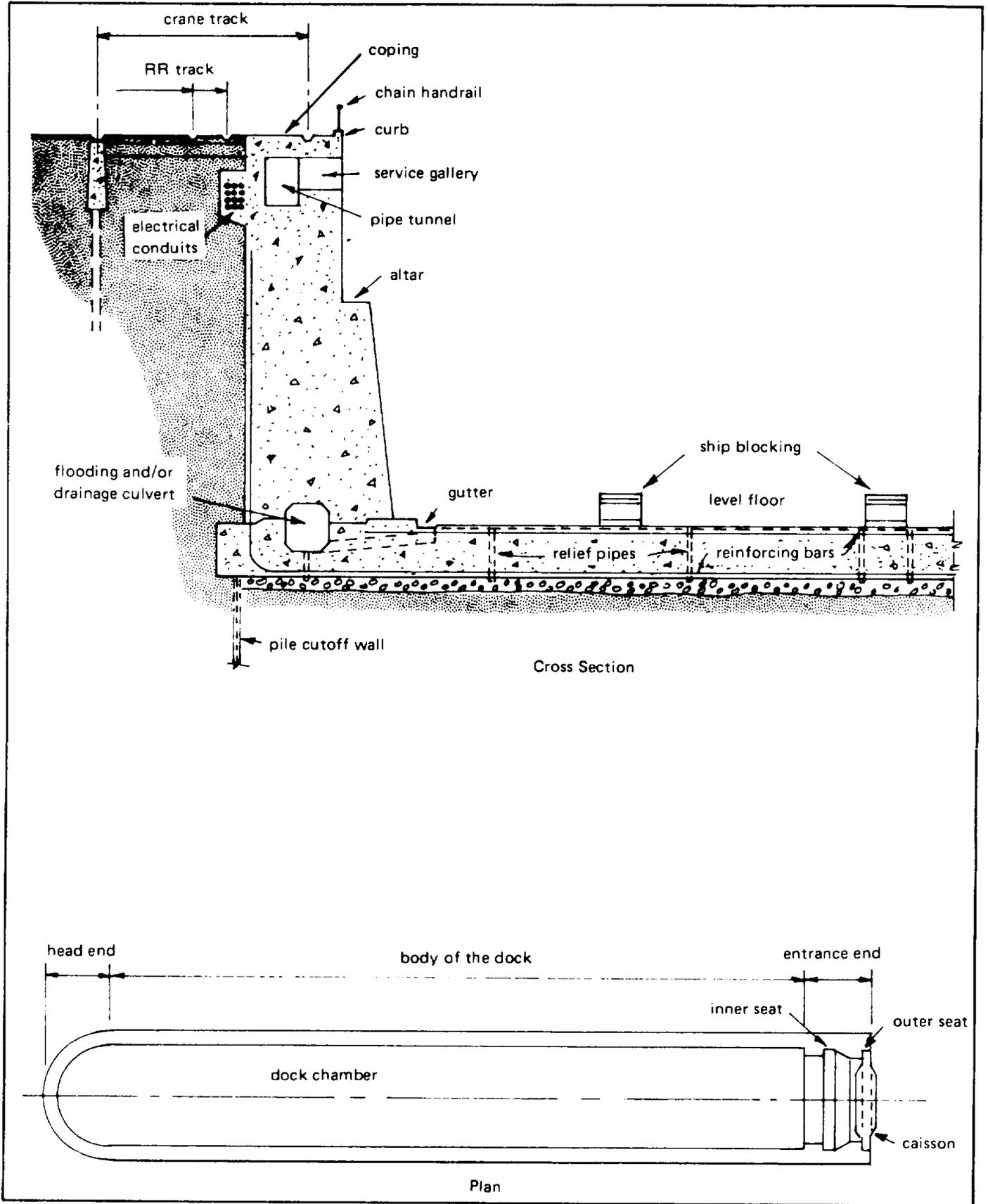


Figure B-1. Designation of drydock features.

Table B-1. Inspection Frequencies

Component	Preventive Maintenance Inspection	Control or Engineering Inspection	Component	Preventive Maintenance Inspection	Control or Engineering Inspection
Electrical:			Mechanical (cont'd):		
Communication equipment and controls	SA	A	Sewage and plumbing system:		
Distribution:			Fixtures	M	A
Transformers	-	A	Piping	M	A
Feeder and branch circuit switchgear	SA	A	Pumps	SA	A
Feeder and branch circuit wiring	-	A	Valves	SA	A
Electric heaters	SA	A	Shore-to-Ship service	Q	A
Lighting equipment and controls	SA	A	Weight handling equipment:		
Motors and motor controls	SA	A	Capstans	Q	A
Shore-to-Ship service	Q	A	Wheeler tank cleaning system	SA	A
Mechanical:			Miscellaneous mechanical equipment:		
Compressed air system:			Chains and sheaves for hauling blocks	Q	A
Air compressors	Q	A	Structural:		
Valves	SA	A	Basin	-	A
Dewatering and flooding systems:			Closure -	A	
Dewatering pumps	SA	A	Crane and railroad rails	-	A
Gates, sluice	SA	A	Drainage and filling tunnels	-	A
Mechanical water level and draft indicator	SA	A	Galleries and altars	-	A
Piping	-	A	Machinery pits	-	A
Vacuum pumps	SA	A	Miscellaneous fittings and accessories:		
Valves	SA	A	Air ports	-	A
Fresh water systems:			Blocking	-	A
Piping	-	A	Bollards and cleats	-	A
Valves	SA	A	Brows and gangways	-	A
Heating and ventilating systems:			Draft gages and marking plates		
Fans	Q	A	Gratings and cover plates	-	A
Piping (steam or hot water)	-	A	Handrails	-	A
Unit heaters and convectors	SA	A	Stairs and ladders	-	A
Valves and traps	SA	A	Stoplogs		
Ventilators and air ducts	-	A			
Salt water systems:					
Piping	-	A			
Valves	SA	A			

A = Annually.  
 SA = Semiannually.  
 Q = Quarterly.  
 M = Monthly.

Table B-2. Inspection Checkoff List

Location \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 Dry Dock Size and Designation \_\_\_\_\_ Date \_\_\_\_\_

Graving Dry Dock No. \_\_\_\_\_

Items Inspected	Degree of Hazard*				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Basic Structure					
Coping					
Walls					
Galleries					
Altars					
Service tunnels					
Stairs and elevators					
Floor					
Apron					
Caisson seats					

\_\_\_\_\_ Signature of Inspector

- N = (Negligible) will not result in personnel injury or system damage. The system or subsystem(s) may be fully utilized. No action required.
- M = (Marginal) can be counteracted or controlled without injury to personnel or major system damage. Usage of the system or subsystem(s) may continue; however, routine maintenance or repair shall be scheduled.
- CR = (Critical) will cause personnel injury or major system damage, or will require immediate corrective action for personnel or system survival. The system or subsystem(s) may continue to be used at the discretion of the commanding officer provided appropriate restrictions are enforced and additional inspections are conducted to check the defect(s).
- CAT = (Catastrophic) will cause death or severe injury to personnel, or system loss. The system or subsystem(s) shall NOT be used until repaired. When necessary to use systems in this category, the commanding officer shall be responsible for safety, and his assigned representative shall supervise each operation involving the system. Temporary or emergency repair may reduce the category-of-hazard, depending on the severity of the defect and based on an engineering evaluation.

**Note: Degree-of-hazard categories based on MI L-STD-882.**

*Inspection Checkoff List (cont'd)*

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Graving Dry Dock No. \_\_\_\_\_

	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Drainage culverts					
Drainage tunnels					
Filling tunnels					
Discharge tunnels					
General appearance					
Pressure relief systems					
Fittings					
Portable guardrails					
Cleats					
Bollards					
Roller chocks					
Handrails					
Gratings					
Crane track					
Draft gages					
Blocking					
Keel blocks					
Bilge blocks					
Hauling bilge blocks					

\_\_\_\_\_ Signature of Inspector

*Inspection Checkoff List (cont'd)*

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Graving Dry Dock No. \_\_\_\_\_

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Services					
Compressed air piping and valves					
Corrosion protection features					
Mechanical Equipment					
Capstan No.					
1 2 3 4 5 6 7 8 9					
Sluice Gates					
Sluice gate leaf					
Sluice gate guides					
Sluice gate operator					
Sluice gate controller					
Hydraulic operating gear					
Lubrication system					
Preservation					
Check Valves					
Valve leaves					
Swing mechanism					
Nonslam mechanism					
Lubrication					
Preservation					

\_\_\_\_\_ Signature of Inspector

Graving Dry Dock No. \_\_\_\_\_

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Stoplogs or Gate					
Guide slot					
Log or gate body					
Hoisting equipment					
Preservation					
Intake screen					

\_\_\_\_\_ Signature of Inspector

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Basic Structure					
Shell plating					
Structural framing					
Bulkheads					
Deck plating					
Top dock covering					
Fenders					
Wood backing for gasket					
Rubber gasket					
Exterior preservation					
Interior preservation					
Ballast compartment preservation					
General condition					
Fittings					
Portable guardrails					
Hatches					
Cleats, chocks					
Steps, ladders, handrails					
Gratings					
Airports					

\_\_\_\_\_ Signature of Inspector

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Compressed air piping					
Compressed air container valves					
Inclinometers					
Water level indicators					
Lighting fixtures					
Mechanical Equipment					
Capstan no. 1					
Capstan motor					
Motor controller					
Capstan no. 2					
Capstan motor					
Motor controller					
Dewatering pump no. 1					
Pump motor					
Motor controller					
Lubrication system					
Foot valve					
Discharge valve					
Valve operator					
Check valve					

\_\_\_\_\_ Signature of Inspector

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Dewatering pump no. 2					
Pump motor					
Motor controller					
Lubrication system					
Foot valve					
Discharge operator					
Check valve					
Trimming Pump No. 1					
Pump motor					
Motor controller					
Discharge valve					
Trimming Pump No. 2					
Pump motor					
Motor controller					
Discharge valve					
Flood Valves					
Flood valve no. 1					
Valve operator					
Flood valve no. 2					
Valve operator					

\_\_\_\_\_ Signature of Inspector

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Flood valve no. 3					
Valve operator					
Flood valve no. 4					
Valve operator					
Flood valve no. 5					
Valve operator					
Flood valve no. 6					
Valve operator					
Flood valve no. 7					
Valve operator					
Flood valve no. 8					
Valve operator					
Flood valve no. 9					
Valve operator					
Flood valve no. 10					
Valve operator					
Flood valve no. 11					
Valve operator					
Flood valve no. 12					
Valve operator					

\_\_\_\_\_ Signature of Inspector

Items Inspected	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Flood valve no. 13					
Valve operator					
Flood valve no. 14					
Valve operator					
Flood valve no. 15					
Valve operator					
Flood valve no. 16					
Valve operator					
Flood valve no. 17					
Valve operator					
Flood valve no. 18					
Valve operator					
Flood valve no. 19					
Valve operator					
Flood valve no. 20					
Valve operator					
Flood valve no. 21					
Valve operator					
Flood valve no. 22					
Valve operator					

\_\_\_\_\_ Signature of Inspector

Caisson No. \_\_\_\_\_

Items Inspection	Degree of Hazard				Remarks (for additional remarks use other side)
	N	M	CR	CAT	
Flood valve no. 23					
Valve operator					
Flood valve no. 24					
Valve operator					
Flooding valve no. 1					
Valve operator					
Flooding valve no. 2					
Valve operator					
Flooding valve no. 3					
Valve operator					
Flooding valve no. 4					
Valve operator					
Equalizing valve no. 1					
Valve operator					
Equalizing valve no. 2					
Valve operator					
Vent blower					
Blower motor					
Motor operator					
Power leads (portable)					
Transformers					
Control panel					

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Signature of Inspector

Table B-3. Coating Systems for Maintenance of Drydocking Facilities

Type of Surface and Exposure	Coating Designation and Minimum Dry Film Thickness (mils)					Total Minimum Dry Film Thickness (mils)
	Pretreatment Wash Primer	First Coat	Second Coat	Third Coat	Fourth Coat	
Exterior steel; immersed in or occasionally wetted with seawater	none	MIL-P-24441 Formula 150 (3)	MIL-P-24441 Formula 151 (3)	MIL-P-24441 Formula 154 (3)	none <sup>a</sup>	9
Exterior steel; always dry	MIL-P-15328 (0.3)	TT-P-645 or MIL-P-17545 (1)	TT-P-645 or MIL-P-17545 (1)	MIL-E-15130 (1-1/2)	MIL-E-15130 (1-1/2)	5
Interior steel other than caissons or chambers; occasionally flooded with seawater	MIL-P-15328 (0.3)	TT-P-645 (1)	MIL-E-17970 or MIL-E-17972 (1-1/2)	MIL-E-17970 or MIL-E-17972 (1-1/2)	none	4
Interior of steel caisson or chamber; occasionally flooded with seawater	none	MIL-C-18480 (14)	MIL-C-18480 (13)	MIL-C-18480 (13)	none	40
Decks and treads	MIL-P-15328 (0.3)	TT-P645 (1)	MIL-P-18210 (1-1/2)	MIL-P-18210 (1-1/2)	none	4
Piping	see Chapter 7					
Concrete and masonry	not painted					

<sup>a</sup>Two coats of MIL-P-15931 applied at 4 mils (total) dry film thickness may retard attachment and growth of fouling organisms for 2 or more years, if fouling is a problem.