NAVSHIPREPFAC YOKOSUKA
LOCAL STANDARD ITEM

FY-02

ITEM NO: 099-71YO
DATE: 24 NOV 2000
CATEGORY: II

1. SCOPE:

1.1 Title: Testing Requirements for Piping Systems; accomplish

2. REFERENCES:

a. S9074-AR-GIB-010/278, Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping, and Pressure Vessels

b. T9074-AS-GIB-010/271, Requirements for Nondestructive Testing Methods

c. MIL-STD-2035, Nondestructive Testing Acceptance Criteria

3. REQUIREMENTS:

3.1 Accomplish testing of piping systems using one of the following options (as applicable) when a test method is not specified in the Work Item: the requirements of 3.2 (Reduced Energy Operational Test), 3.3 (Additional Nondestructive Testing method), 3.4 (Hydrostatic Test) or 3.5 (Static Test).

3.1.1 Accomplish the requirements of 3.4 at 100 percent of nominal operating pressure for new and disturbed piping for the following systems, when the nominal operating pressure and temperature is above the Reduced Energy criteria (see 4.1 and 4.2):

3.1.1.1 Piping systems that are not pressurized or fully pressurized during normal system operation.

3.1.1.2 Piping systems operated only during Ship's underway periods.

3.1.1.3 Piping systems that do not allow sufficient time to inspect affected joints.

3.1.1.4 Piping systems where the operating fluid is a hot gas (operating temperature greater than 200 degrees Fahrenheit).

3.1.1.5 Boiler pressure vessel piping (see 4.3).

3.1.1.6 Requirements of 3.3 (as applicable) must be completed to accomplish operating pressure hydrostatic test requirements of 3.1.1.

3.1.2 The following systems are excluded from the "Reduced Energy" or "Additional Nondestructive Testing" requirement and shall be tested in accordance with 3.4 to pressures listed in the Work Item.

3.1.2.1 Lethal (as defined in 2.a).

3.1.2.2 Oxygen.

3.1.2.3 Hydrogen.

3.1.2.4 Halon.

3.1.2.5 CO_2.

3.1.2.6 Aqueous Potassium Carbonate (APC) Fire Extinguishing.

3.1.2.7 Vacuum, Collection, Holding and Transfer (CHT) Sewage (portions under vacuum only).

3.2 Accomplish an operational test of weld joints of piping systems having a nominal operating pressure of 200 PSIG or less, and a nominal operating temperature of 200 degrees Fahrenheit or less, and brazed joints and mechanically attached fittings regardless of pressure or temperature.

3.2.1 Operational test of compressed air and gas systems (other than Reduced Energy criteria systems, Halon, CO_2 and APC Fire Extinguishing), shall be at maximum system operating pressure vice nominal.

3.2.2 Accomplish an air test of the gasoline, JP-5, fuel, and propane systems, using clean, dry air or nitrogen at 50 PSIG for systems with nominal operating pressure of 50 PSIG and greater, or at system operating pressure for systems lower than 50 PSIG, prior to the operating pressure test.

3.2.3 Maintain test pressure for a minimum of 30 minutes prior to inspection and throughout the inspection period.

(V)(G) or (I)(G) "VISUAL INSPECTION" (See 4.4)

3.2.4 Visually inspect the pressurized system for evidence of external leakage and deformation. Allowable external leakage: None.

3.2.4.1 Inspect new and disturbed joints for leakage at intervals as the pressure is increased to nominal operating pressure (when possible). Joints requiring inspection shall remain uninsulated and unpainted until completion of successful inspection.

3.3 Accomplish nondestructive testing (NDT) for the new welded joints in lieu of hydrostatic testing. The following requirements are in addition to the specific NDT requirements required by the invoking Work Item.

3.3.1 For Class P-2 piping exceeding a nominal operating system pressure of 200 PSIG or nominal operating system temperature of 200 degrees Fahrenheit:

(V) "LIQUID PENETRANT INSPECTION"

3.3.1.1 Accomplish liquid penetrant tests (PT) on final layer of all weld joints in accordance with 2.b. The accept or reject criteria shall be in accordance with Class 2 of 2.c. Substitution of magnetic particle testing (MT) is not permitted.

3.3.2 For Class P-1 and P-LT piping:

(I) "LIQUID PENETRANT INSPECTION" or "MAGNETIC PARTICLE INSPECTION"

3.3.2.1 Accomplish PT or MT on root layer of all weld joints in accordance with 2.b. The accept or reject criteria shall be in accordance with Class 1 of 2.c. Substitution of 5X visual inspection, radiographic testing (RT), or ultrasonic testing (UT) is not permitted.

(I) "LIQUID PENETRANT INSPECTION"

3.3.2.2 Accomplish PT on final layer of all weld joints in accordance with 2.b. The accept or reject criteria shall be in accordance with Class 1 of 2.c. Substitution of MT is not permitted.

3.3.3 Accomplish an operational test in accordance with 3.2.

3.4 Hydrostatically test piping systems in accordance with the following:

3.4.1 Isolate system components upstream and downstream of the affected piping by means capable of withstanding the test pressure.

3.4.2 Provide a sketch of that portion of the system to be tested, showing location of blanks, isolation valves, test connection, and the location of air vents used to vent air (see 4.5).

3.4.2.1 Sketch shall be on the test site during accomplishment of the test.

3.4.3 Provide and maintain a written record of temporary blanks, plugs, and gages installed to accomplish test, with a signed check-off sheet verifying installation and removal (see 4.5).

3.4.4 Test equipment shall have the following capabilities:

3.4.4.1 Manual overpressure protection release valve.

3.4.4.2 Self-actuated and resetting relief valve with a set point no greater than 100 PSIG above the test pressure or 10 percent above the test pressure, whichever is less.

3.4.4.3 Master and backup test gages with gage range and graduation shown on Table One.

3.4.4.4 Protection equipment shall be accessible and test gages shall be located where clearly visible and readable to pump operator and inspector.

(V)(G) or (I)(G) "VISUAL INSPECTION" (See 4.4)

3.4.5 Visually inspect the pressurized system for evidence of external leakage and deformation.

3.4.5.1 Acceptance criteria shall be that there are no signs of external leakage, with the exception of mechanical joints not disturbed, and no permanent deformation of pressure containing parts as determined by visual inspection.

3.4.6 Maintain test pressure for a minimum of 30 minutes prior to inspection and throughout the entire inspection period.

(V)(G) or (I)(G) "OPERATIONAL TEST" (See 4.4)

3.4.7 Accomplish an operational test of the new and disturbed piping at nominal system operating pressure and temperature. Allowable external leakage: None.

(V)(G) "STATIC TEST"

3.5 Accomplish a static head pressure test of new and disturbed gravity drain piping (unpressurized piping) using clean, fresh water for a minimum of 30 minutes. Allowable leakage: None.

(V)(G) "OPERATIONAL TEST"

3.5.1 Accomplish an operational test of new and disturbed gravity drain piping for proper operation and unobstructed flow.

(V)(G) "OPERATIONAL TEST"

3.5.2 Accomplish an operational test of new and disturbed sounding tube piping by inserting a 16 inch theft sampler into sounding tube until it bottoms. Accomplish the test a minimum of four times for each sounding tube. There shall be no binding or sticking of sampler during this test.

4. NOTES:

4.1 Reduced Energy systems are defined as systems having a nominal operating pressure of 200 PSIG or less, and a nominal operating temperature of 200 degrees Fahrenheit or less.

4.2 Operational testing of Reduced Energy systems, which meet the criteria of 3.1.1.1 through 3.1.1.3, is not required.

4.3 Boiler pressure vessel piping is defined as, "The piping from the pressure vessel drum or header up to the first valve of the pressure vessel drum or header."

4.4 The paragraph referencing this note is considered an (I)(G) if the system is P-1, P-LT or P-3A. If the system is P-2 or P-3B, then the paragraph is considered (V)(G).

4.5 The requirements 3.4.3 and 3.4.4 are not applicable to testing of piping assemblies or components accomplished prior to installation in ship's system.

4.6 Test pressure and test medium will be specified in the invoking Work Item.

TABLE ONE

MASTER GAGE SELECTION FOR HYDROSTATIC TESTS

Maximum Test Pressure (lb/in^2g)		Master Gage Range*** (lb/in^2g)		Master Gage Maximum Graduation Size (lb/in^2g)
From*	To**	From	To	
5000	9500	0	10000	100
3000	5800	0	6000	30
2500	4800	0	5000	30
1500	2800	0	3000	20
1000	1800	0	2000	15
750	1300	0	1500	10
500	800	0	1000	10
250	500	0	600	5
150	250	0	300	2
100	175	0	200	2
75	125	0	160	1
50	80	0	100	1
20	50	0	60	0.5
10	25	0	30	0.2
7	10	0	15	0.1
5	7	0	10	0.1

NOTES:

1. Master gage and back-up gages shall be track within two percent of each other.

2. System maximum test pressure shall be determined by applicable overhaul specification, building specification, or other governing documents.

* Values agree with the requirement that gage range shall not exceed 200 percent of maximum test pressure except for gage ranges 0 to 60 and below.

** Valves allow for reading pressures up to relief valve setting.

*** Exceptions to the values given in this table may be approved locally by design, based on an evaluation of test pressure, gage range, and specific application.