Naval Facilities Engineering Command

Technical Memorandum
TM-CHENG/05-010-SCA
REVISION B

A

NAVFAC System Certification Authority (SCA) Policy for Hyperbaric Pressure Vessels and Associated Relief Valves; ~~Systems for Man Rated Use Only~~

29 Sept. 2008

Robert M. Bauer

By: NAVFAC Hyperbaric Systems Certification Authority (SCA)
NAVFACHQ Code OFP
Washington Navy Yard
1322 Patterson Avenue SE Suite 1000
Washington DC 20374-5065

DESCRIPTION OF REVISIONS

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1. Deleted from the cover "Systems for Man Rated Use Only," because changes to the relief valve maintenance form incorporate relief valves for unmanned hyperbaric pressure test facilities.

2. Added clarification to the scope with additions to paragraphs 1.0.1 and paragraph 1.0.2

3. Clarified paragraph 2.2.4 regarding NDT Qualifications

4. Changed periodicity for external visual inspection in paragraph 3.0.1; periodicity relaxed as external inspection periodicity was "Annual"

5. Added footnote 3 to table in paragraph 3.0.1 acknowledging some volume tanks may require alternate means of inspection.

6. Made typographical corrections to paragraphs 3.2.1, 3.2.3, and 3.2.5

7. Changed title of Appendix (C), and expanded to include new information regarding ultrasonic testing, including reduced number of required thickness measurements for flasks.

8. Updated Appendix (D) by deleting government facility #2.

9. Re-wrote Appendix (E) Relief Valve Maintenance Document in its entirety, and incorporated field comments. Basic relief valve testing requirements did not change. Clarification to tolerances with a new section defining the difference between Maximum System Operating Pressure (MSOP) and Maximum Allowable Working Pressure (MAWP) has been added. Relief Valve Maintenance document is now applicable to unmanned pressure test facilities certified by NAVFAC SCA.

DESCRIPTION OF REVISIONS

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1. Changed maintenance requirements for volume tanks. All NAVFAC volume tanks now require an annual external inspection to normalize inspections with flasks. The reason is NAVFAC has found unacceptable volume tanks leaking at a weld due to microbiologically induced corrosion. Looking at volume tanks on an annual basis also justifies changing maintenance periodicity for the dry stainless steel tanks from 3 years to 6 years. Dry stainless steel volume tanks do not require internal inspection if a command chooses to have their wall thickness confirmed by ultrasonic inspections to be performed in conjunction with flask UT inspections.

2. Added paragraph 4.2.2 In-Place Relief Valve Testing. It is recognized that there are limited cases where the removal of relief valves is not only difficult but can be detrimental to the system.

3. Removed reservation cloud from the procedure for obtaining shear wave calibration standards. Commands can now obtain cal blocks using the "Request For Equipment" form found in appendix (c).

4. Added Naval Undersea Warfare Center, Keyport WA to appendix (d) for testing of their hydrostatic tank relief valves only.

1.0.0 SCOPE

1.0.1 This Technical Memorandum (TM) normalizes the Planned Maintenance System (PMS) for hyperbaric support vessels to become more in line with NAVSEA diving and diver's life support system PMS[1]. This TM also provides relief valve maintenance instructions associated with certified unmanned pressure test facilities. The requirements in this TM supersede the requirements of UFC 3-430-07. As authorized by NAVFAC letter CHENG/05-010, dtd 22 Feb 05, certification of hyperbaric support vessels will no longer be accomplished by NAVFAC Boiler Inspectors. The NAVFAC Hyperbaric Systems Certification Authority has responsibility to certify ashore diving and hyperbaric systems. The system certification issued for the facility applies to all equipment within the scope of certification, which includes hyperbaric support vessels.

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1.0.2 This TM is intended to address the larger system pressure vessels that require dedicated relief valve protection. This TM does not apply to the smaller pressure vessel components such as compressor moisture separators and filter towers. This TM is divided into three parts addressing flasks, volume tanks, and relief valves. Each part begins by addressing PMS periodicity and the schedule that shall be implemented. Two sections follow periodicity. Section A is intended to clarify overall inspection and testing requirements by identifying changes to UFC 3-430-07 or previous requirements. Section B is intended to identify the inspection details, and is further supported by other details that are either referenced in each section or contained within the appendix of this document.

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1.0.3 This TM does not address flasks that are certified to Department Of Transportation (DOT) requirements. DOT requirements are governed by the Code of Federal Regulations (49CFR173). Further details can be found in NAVSEA Topside Tech Notes – "Flasks" currently dated April 2004.

2.0.0 Part I - High-Pressure Flasks (ASME and MIL-F-22606)[2]

2.0.1 Periodicity: All high-pressure divers breathing gas flasks (Air, Oxygen, Helium, Helium-Oxygen and Nitrogen) shall be phased into a new periodicity of ultra-sonic inspection (including shear wave UT) and recertification every 6-years (72M). NAVFAC hyperbaric diving systems shall adjust their Planned Maintenance Schedules (PMS) to reflect a 6-year start date from their last inspection. Example - If a facility was inspected in June 2003, and has an upcoming inspection already scheduled, that facility has the option of performing a new baseline inspection and establishing a new PMS clock start date. The next inspection required would come due in June.

2.0.1.1. Another option is to set the next PMS date due 6-years from previous inspection with a new due date of June 2009. Note – it is the responsibility of each command to review the last three flask wall thickness UT inspections, for each flask, to verify there has been no progressive material loss. If this cannot be accomplished then the new baseline inspection is required.

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[1] Reference NAVFAC SCA MEMO dtd Mar 18: Technical Justification For Changes To Hyperbaric And Diving Systems PMS.

[2] ASME stands for American Society of Mechanical Engineers. An ASME flask can be identified by finding a unique stamp on the flask, as well as a National Board number.

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2.1.0 Section A Changes to Requirements

2.1.1 Internal inspections - Internal inspections are not required unless a specific reason warrants the intrusive inspection. Internal inspections shall be conducted when loss of wall thickness is found or other abnormalities are found from the shear wave ultra-sonic Non-Destructive Testing (NDT).

2.1.2 Hydrostatic Testing – Strength testing is no longer a requirement to recertify. Independent technical analysis has determined that shear wave ultrasonic tests will find cracks, when present. This, with no detected loss of wall thickness, will indicate vessel integrity. The effort required to get a flask cleaned and dried after becoming wet from hydrostatic testing is not warranted. An elevated pneumatic pressure test above maximum joint tightness testing is not required. Strength testing is only associated with repairs to pressure vessel boundary.

2.1.3 Shear Wave Ultrasonic Testing – ASME flasks previously inspected to NAVFAC requirements have not been subjected to this type of ultrasonic testing. MIL-F-22606 flasks inspected in accordance with Naval Ship's Technical Manual (NSTM Chapter 551) have been subjected to this type of NDT. This requirement is added to ASME flasks to ensure cracks are not present, and supports the technical decision to delete hydrostatic strength testing. See Appendix (C) for further guidance.

2.1.4 External Inspection - Documentation of high-pressure flasks shall be conducted on annual bases. The NAVFAC SCA requires this inspection to be documented by completion of the form established in Appendix (A) of this document. Appendix (A) is an added requirement.

2.2.0 Section B Inspection Details

2.2.1 NSTM Chapter 551 - Requirements for flask inspections shall be in accordance with Naval Ship's Technical Manual (NSTM Chapter 551) as supported by the NAVSEA Technical Publication "Requirements For Nondestructive Testing Methods" (NAVSEA T9074-AS-GIB-010/271). Any questions regarding application of requirements shall be forwarded to the NAVFAC SCA, with sufficient time to address, prior to inspection implementation. See Appendix (C) for further guidance.

2.2.2 Documentation - For ASME flasks, each command shall provide a copy of the associated flask Form U-1A (Manufacturers' Data Report For Pressure Vessels), to the qualified NDT examiner for wall thickness information (an example Form U-1A can be found in Appendix (B) of this document). This is required because the table of known minimal wall thickness for MIL-F-22606 flasks is well established, while ASME flasks vary by design. If a command does not have a copy of their flask Form U-1A, they should contact the NAVFAC SCA for guidance. If the SCA does not have a copy, each command shall obtain a copy from the ASME National Board. In cases where the information contained on the Form U-1A is a nominal vs minimal wall thickness, questions shall be forwarded to the SCA only after wall thickness measurements have been obtained and determined to be in question (ie under nominal).

2.2.3 Record Retention - Each command is responsible for maintaining all flask records, in an auditable fashion, for the life of the system. These records shall retain all NDT readings. All readings from previous NAVFAC Boiler Inspector examinations shall be maintained with these records. Each command shall review their past wall thickness measurements prior to determining how they will phase in this new PMS. Should questions arise regarding a potential trend showing loss of flask wall thickness, the NAVFAC SCA shall be contacted.

2.2.4 Qualifications - Each command shall schedule and fund these inspections. Each command is responsible for ensuring only qualified NDT examiners perform the work. A list of qualified examiners does not exist. NSTM Chapter 551 and NAVSEA T9074-AS-GIB-010/271 contain details of qualification requirements. Any company with the correct equipment, who is qualified to meet the American Society for Non-Destructive Testing (ASNT) shall be considered, qualified. A full copy of the SCA survey checklist can be found on the NAVSEA and NAFAC SCA web sites. A portion of this checklist focusing upon flasks can be found in Appendix (C) of this document. This checklist will be utilized by the SCA every certification survey that occurs after a 6-year inspection.

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2.2.5 External Inspection - The inspection details contained within this document do not change the periodicity of required annual external inspection. However, for NAVFAC Shorebased Systems, the yearly external inspection requires additional documentation. Appendix (A) of this document contains an external inspection form that shall be completed when the annual inspection of the flasks are completed.

3.0 Part II - NAVFAC Hyperbaric SCA Policy – Low/Medium Pressure Volume Tanks

3.0.1 Periodicity – the following matrix of PMS shall be followed:

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Tank Type	External Visual Inspection	Internal[3] Visual Inspection	NDT (If Required)
Air Volume Tank - Medium/Low Pressure Dry Divers Air (Carbon Steel)	1-year	3-year	3-year
Fire Suppression System Tank Medium/Low Pressure Wet Divers Air (Carbon Steel)	1-year	2-year	2-year
Air Volume Tank - Medium/Low Pressure Dry Divers Air (Stainless Steel)	1-year	NA See Note	6-Year See Note
Fire Suppression System Tank Medium/Low Pressure Wet Divers Air (Stainless Steel)	1-year	2-year	2-year

NOTE – Dry Stainless Steel Volume Tanks do not require internal inspection if the command chooses to perform an ultrasonic thickness measurement. This can be accomplished in conjunction with the UT measurements performed on high pressure flasks. Shear wave of volume tanks is not required. If any questions arise during the UT, then internal inspection shall be performed.

[3] NOTE – Some pressure vessels are not easily inspected. The NAVFAC SCA recognizes that some items such as in-line gas accumulators may not have removable inspection plugs. In these cases contact the NAVFAC SCA for possible alternatives to the internal inspection

3.1.0 Section A Changes to Requirements

3.1.1 External Inspection shall be required annually with documentation (see Appendix (A)). This external inspection should be performed in conjunction with the high pressure flask inspections.

3.1.2 Hydrostatic Strength Testing shall not be required for PMS. Strength testing is only associated with repairs to pressure vessel boundary.

3.1.3 PMS Periodicity for some tanks (Wet FSS Tanks) remain on a two year cycle until future independent technical evaluation allows change.

3.2.0 Section B Inspection Details

3.2.1 NAVSEA 00C3-PI-005 - NAVSEA 00C3 inspection requirements shall be adopted for NAVFAC volume tanks with the exception of the periodicity specified. NAVFAC periodicity shall follow the table contained in 3.0.1 of this TM.

3.2.2 Documentation - For ASME volume tanks, when NDT is performed, each command is required to provide a copy of the associated Form U-1A (Manufacturers' Data Report For Pressure Vessels), to the qualified NDT examiner for wall thickness information (an example Form U-1A can be found in Appendix (B) of this document).

3.2.3 Record Retention - Each command is responsible for maintaining all records. Records shall be maintained in an auditable fashion, for the life of the system. These records shall retain all NDT readings. All readings from previous NAVFAC Boiler Inspector examinations shall be maintained with these records.

3.2.4 Qualifications - Each command is required to schedule and fund these inspections. Each command is responsible for ensuring only qualified NDT examiners perform the work. NSTM Chapter 551, NAVSEA T9074-AS-GIB-010/271, NAVSEA 00C3-PI-005 contain details of qualification requirements.

3.2.5 External Inspection - Appendix (A) of this document contains a form that shall be completed when the annual inspection of the volume tanks are completed. This annual external inspection has be determined to be prudent because it normalizes the inspection with the flask inspections, and historically volume tanks that have been found it have problems have been detected by external weapage (reference Duke University and Travis Air Force Base FES Tank repairs).

4.0.0 Part III - NAVFAC Hyperbaric SCA Policy – ASME Relief Valves

4.0.1 Periodicity - relief valves protecting all high-pressure diver's breathing gas flasks (ASME or MIL-F-22606), shall remain on a 3-year calibration/re-test periodicity. ASME relief valves protecting ASME flasks have been required to be calibrated ever 2 years per UFC 3-430-07. This no longer applies to ASME relief valves.

4.1.0 Section A Changes to Requirements

4.1.1 Repairs – Cutting The Seal. For diver life support systems certified by the NAVFAC SCA, "Repairs by the Government are prohibited" as identified in UFC 3-430-07 is replaced as follows. Any shop authorized to label the valve with a National Board VR nameplate can conduct an in-shop test, adjustment, and repair of subject relief valve. Alternatively any shop included in Appendix (D) is considered qualified. Configuration changes such as changing seat material, springs or pressure boundary piece parts are not allowed. In kind replacement of seats and springs is allowed provided it is documented. Any other shop is required to be approved by the NAVFAC SCA prior to allowing them to perform repairs. Bench testing the relief valves with no adjustments may be performed by a non-ASME shop/Government.

4.1.2 Documentation – Every relief that is tested and/or repaired must be accomplished using a new NAVFAC Relief Valve Maintenance Form (See Appendix (E) of this document). This is an added requirement.

4.2.0 Section B Inspection Details

4.2.1 Documentation – Every relief verification and/or repair must be accomplished using a new NAVFAC Relief Valve Maintenance Form (See Appendix (E) of this document). This form shall be filed with the associated REC. This form is required for the following reasons: First, the adjustments required, if any, will be documented such that trend analysis is possible. Second, the work performed and the way it was performed is documented such that the NAVFAC SCA can reconstruct details of testing or repair procedures. Thirdly, the Objective Quality Evidence (OQE) for any and all pieces installed will be documented. The fourth point is documentation will be obtained that divers breathing gas cleanliness has been maintained. The last two points are required by REC, however, completion of this form will re-enforce the importance and will also support stand alone SCUBA charging systems that are not certified.

4.2.1 IN-PLACE RELIEF VALVE TESTING – On a limited basis, commands are allowed to perform crack and re-seat of installed relief valves without their removal. This is only allowed with prior NAVFAC SCA approval. Approval will be based upon the need and review of the technique. Safety provisions are required to ensure system over pressurization cannot occur. Typically this is only allowed if an independent testing authority (Such as METCAL) uses specialized equipment (eg King Nutronics test equipment) to a specific service proven procedure that meets necessary quality assurance plans for accuracy and consistency.

Appendices

(A) Pressure Vessel External Inspection Form

(B) Flask Form U-1A Manufacturers' Data Report For Pressure Vessels

(C) NDT Guidance

(D) Activities Authorized to Repair Relief Valves

(E) NAVFAC Relief Valve Maintenance Form

Appendix (A)

Pressure Vessel External Inspection Form

NAVFAC Pressure Vessel (PV) External Inspection Form

This form shall be completed and retained with the facilities flask inspection records. The intent is to document exterior PV conditions to support the change to ASME PV PMS periodicity. This document shall be completed when the A-1R PMS is completed. All observations made shall be considered significant and efforts to provide information to future inspections shall be made. Initial inspections will likely find small dings and dents that have been previously accepted. Past NAVFAC Boiler inspection documentation shall be referenced where available. **Anything that could be added to this form that will allow future reconstruction of existing conditions (sketches showing locations or more preferably digital photographs) shall be accomplished.** The intent is to capture the existing condition of the exterior of installed PVs and to track the conditions. When questionable anomalies are found, the command shall take additional action such as localized ultrasonic (UT) wall thickness measurements and/or other non-destructive examinations to ensure PV integrity (ie – PT, shear wave UT, or RT).

System PV Designation_____ (i.e. AHP 1-1) PV SN _____

PV External Condition[4] _____

_____

_____

_____

System PV Designation_____ (i.e. AHP 1-1) PV SN _____

PV External Condition_____

_____

_____

_____

System PV Designation_____ (i.e. AHP 1-1) PV SN _____

PV External Condition_____

_____

_____

_____

ADD SHEETS FOR ADDITIONAL FLASKS AS NECESSARY

_____ _____ _____

External Inspection Form Signature **Print Name** **Date**

[4] Corrosion, gouges, dents and nicks shall be closely examined to determine depth of defect. Any defect 1/16 (0.0625) inch or greater in depth shall be cause for ultrasonic examination of the affected area to determine the remaining wall thickness. Documentation of prior acceptance by the previous NAVFAC Boiler Inspector reports shall be added to this document to avoid duplicate UT examinations.

Appendix (B)

Flask Form U-1A Manufacturers' Data Report

For Pressure Vessels

FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS

(Alternative Form for Single Chamber, Completely Shop-Fabricated Vessels Only)
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by CP INDUSTRIES, INC., CHRISTY PARK PLANT, 2214 WALNUT STREET, McKEESPORT, PA 15132
(Name and address of Manufacturer)

ufactured for TECNICO CORPORATION, 831 INDUSTRIAL AVE., CHESAPEAKE, VA 23324
(Name and address of Purchaser)

3. Location of installation NOT KNOWN
(Name and address)

4. Type HORIZ. (Horiz. or vert. tank) | 46385 (Mfgr's serial No.) | (CRN) | 4X15972 (Drawing No.) | 46385 (Nat'l Bd. No.) | 1999 (Year Built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER and PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME rules, Section VIII, Division 1 1998 (Year)

to 1999 AND APPENDIX 22 (SF=3) (Addenda (Date)) | (Code Case Nos.) | (Special Service per UG-120(d))

6. Shell: SA 372 GRADE J, CLASS 70 (Mat'l. (Spec. No., Grade)) | 1.303" (Min. Thk. (in.)) | 0 (Corr. Allow. (in.)) | 20" (Diam. O.D. (in.)) | 5'-8" (Length (overall) (ft. & in.))

7. Seams: SEAMLESS (Long. (Welded, Dbl., Sngl., Lap, Butt)) | NONE (R.T.(Spot or Full)) | 100 (Eff.(%)) | (H.T. Temp(F)) | (Time(hr)) | SEAMLESS (Girth (welded, Dbl., Sngl., Lap, Butt)) | NONE (R.T. (Spot, Partial or Full)) | 1 (No. of Courses)

8. Heads: (a) Matl. SAME AS 6. (Spec No., Grade) (b) Matl. SAME AS 6. (Spec No., Grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	ENDS	1.303"	0					10"		CONCAVE
(b)	(INTERGRALLY FORGED HEADS AND NECKS)									

If removable, ends used (describe other fastenings) (Matl., Spec. No., Gr., Size, No.)

9. MAWP 5500 psi at max. temp. +200 F °

Min. design metal temperature -20 °F at 5500 psi. Hydrostatic test pressure 8250 psi

zzles, inspection and safety valve openings:

Purpose (Inlet, Outlet, Drain)	No.	Diam. or Size	Type	Matl.	Nom. Thk.	Reinforcement Matl.	How Attached	Location
INLET/OUTLET	2	2 3/4"	THREAD				FORMED	IN HEADS

11. Supports: Skirt NO (Yes or no) Lugs 0 (No.) Legs 0 (No.) Other NONE (Describe) Attached N/A (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned inspectors have been furnished for the following items of the report: (Name of part, item number, Mfgr's. name and identifying stamp)

CONSTRUCTED IN ACCORDANCE WITH APPENDIX 22, INTEGRALLY FORGED VESSELS. DRY GAS STORAGE, NON CORROSIVE SERVICE.

VESSEL MATERIAL IMPACT TESTED PER UHT-6. LIQUID Q&T PER SA 372. SC15090

NOT FOR HYDROGEN OR CNG. VESSEL OAL: 8'-0" PIPE NO: D094 MO 7238

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1. "U" Certificate of Authorization No. 1127 expires 3/30 20 00.

Date: 11/9/99 Co. Name: CP INDUSTRIES, INC. (Manufacturer) Signed: (Representative)

CERTIFICATE OF SHOP INSPECTION

Vessel constructed by CP INDUSTRIES, INC. at McKEESPORT, PA I, the undersigned, ding a valid Commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of PENNSYLVANIA and loyed by ABS GROUP INC., HOUSTON, TX have inspected the component described in this Manufacturer's Data Report on 11/12, 19 99 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 11/12/99 Signed Michael J. Ferris (Authorized Inspector) Commissions NB 11193 AB PA2630 (Nat'l Board (Incl. endorsements, State, Prov. and No.)

APPENDIX (B)

Appendix (C)

NDT GUIDANCE

Appendix (C)
Non-Destructive Guidance

A

1.0 Introduction

This appendix is provided as guidance and to identify changes to requirements that have yet to become incorporated into NSTM Chapter 551. This appendix introduces the process for commands to obtain flask calibration blocks necessary to accomplish shear-wave ultrasonic examination. This appendix also provides a copy of the SCA checklist to highlight what types of records review will be performed by the SCA during certification surveys.

2.0 Reduced Number of Thickness Measurements

The required grid pattern for ultrasonic thickness measurements of high-pressure flasks identified in NSTM Chapter 551 has been relaxed by NAVSEA. A revision to NSTM Chapter 551 is being worked on. In lieu of a 6" X 6" grid pattern, it is acceptable to take measurements at the intersection of a 12" X 12" grid +/- ½" across the entire wall and hemi-head intersection of the flask. Where the cylinder meets the hemi-head of the flask, measurements shall be taken up to two inches below the intersection. There is no need to try to take measurements for thickness in the neck area because due to manufacturer process, this area is ever increasing in thickness such that additional calibrations with additional calibration standards would be required to measure the thickest portion. Per the manufacturer, thickness measurements in this area would be inconclusive at best.

3.0 Ultrasonic Shear Wave Thickness Measurements

The following reservation will be removed by future revision of the document. As of May 2007, the NAVFAC SCA has procured scrap flask material and is in the process of manufacturing calibration standards for use by diving commands. Until this reservation is lifted, it is recognized by the NAVFAC SCA that most commands will not be capable of accomplishing the shear wave inspection because very few standards exist for use with ASME flasks.

Note

When a command has flasks that have not been hydrostatically tested within the past 12 years, and are due for certification, contact the NAVFAC SCA so that a priority waiting list can be established. Implementation of shear wave inspection is the technical justification that allowed elimination of hydrostatic testing of flasks identified in NSTM Chapter 551.

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3.1 Procedure for Obtaining Calibration Standards

3.1.1 The form on the following page may be used to obtain calibration standards. The point of contact, Mr. Jamie Kelly, Facility Manager at the NAVFAC Ocean Construction Equipment Inventory Facility is listed. All commands shall include copies of all requests sent to the NAVFAC SCA when sending to Mr. Kelly.

Flask Calibration Blocks

- **First Round Completed / NAVFAC Will Add to Inventory as Needed**

CAL Block Stamped Information	Related Flask Information
ASME SA372 GRADE J CL70 18"OD	.764" Min. wall thickness MAWP 3304 @ SF=3 & no Corr. Allow.
ASME SA372 GRADE J CL70 20"OD	1.366" min. Wall thickness MAWP 5500 psi @ SF=3 & no CA
MIL-F-22606C CLASS 3000 18"OD	.561" min. wall thickness TYPE GF or CD per Ref. (1)
MIL-F-22606C CLASS 5000 18"OD	.933" min. wall thickness TYPE GF or CD per Ref. (1)
DOT-3AA-2400 24"OD	.584" min. wall thickness

REQUEST FOR EQUIPMENT **OCSF**

DATE: _____

FROM:	**Name:**	
	Command:	
	Phone:	
	Fax:	

To: Jamie Kelly, Facility Manager
OCSF Bldg. 252
St. Juliens Creek Annex
Portsmouth, VA 23702
Fax: (757) 396-0479 Phone: (757) 485-6403 (DSN 386-6403)
E-MAIL: jamie.kelly2@navy.mil

The following equipment is requested:

EQUIPMENT DESCRIPTION	OCEI / CATALOG NO.

PROJECT:

REQUIRED ON SITE NOT LATER THAN: DATE:	USE TRANSPORTATION ACCOUNT CODE: TAC #

SHIP TO ADDRESS:

POC:	PHONE:

Funding will be provided by:

Projected return date:

Signature of requestor: _____

OCEAN CONSTRUCTION EQUIPMENT INVENTORY

OCSF

REQUEST FOR EQUIPMENT

DATE: 28-Jul-08

FROM:
Name: NDCM(MDV) Bill O. Morris
Command: SRF-JRMC Yokosuka Japan
Phone: 243-7165
Fax:

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To: Jamie Kelly, Facility Manager
OCSF Bldg. 252
St. Juliens Creek Annex
Portsmouth, VA 23702
Fax: (757) 396-0479 Phone: (757) 485-6403 (DSN 386-6403)
E-MAIL: jamie.kelly2@navy.mil

The following equipment is requested:

EQUIPMENT DESCRIPTION	OCEI / CATALOG NO.
One set of Calibration Blocks for ASME SA372 GRJ CL70 20"OD x1.303" min wall	UNKNOWN

PROJECT: SRF-JRMC RCF 6500 flask UT inspection

REQUIRED ON SITE NOT LATER THAN:
DATE: 02 FEBUARY 2009

USE TRANSPORTATION ACCOUNT CODE:
TAC # UNKNOWN

SHIP TO ADDRESS:
U.S. Naval Base Yokosuka Japan
U.S. Naval Ship Repair Facility & JRMC Yokosuka
Bldg. 2053, 1-Honcho, Yokosuka, Kanagawa Japan 238-0041
Attn: POC Bill Morris, Code Y338, Phone#: 0468-16--7165

POC: NDCM(MDV) Bill Morris
PHONE: 0468-16-7165

Funding will be provided by:
NAVFAC System Certification Program

Projected return date:
16 FEBUARY 2009

Signature of requestor:

OCEAN CONSTRUCTION EQUIPMENT INVENTORY

Appendix (D)

Activities Authorized to Repair Relief Valves

For a maintenance facility to be added to this list, NAVFAC SCA approval is required. The approval process includes, but is not limited to: review of an adequate quality assurance program; verification of ability to maintain diver life support system cleanliness and/or clean to the requirements of MIL-STD-1330 and/or MIL-STD-1622 as applicable; working level knowledge of diver re-entry control procedures, and assurance that the NAVFAC Relief Valve Maintenance Form will be accurately completed.

Part A Government - Naval Facilities

1) TRIDENT Refit Facility (TRF), Kings Bay, GA

~~2) Naval Submarine Support Facility (NSSF), New London, CT~~ A

3) Shore Intermediate Maintenance Activity (SIMA), Norfolk, VA

4) Naval Ship Repair Facility (SRF), Yokosuka, Japan

5) USS Frank Cable (AS 40)

6) Shore Intermediate Activity (SIMA) San Diego, CA

7) Norfolk Naval Shipyard, Portsmouth, VA

8) Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor, HI

9) Portsmouth Naval Shipyard, Portsmouth, NH

10) Puget Sound Naval Shipyard and Intermediate Maintenance Facility, Bremerton, WA

11) Navy Experimental Diving Unit, Panama City Beach, FL

12) Naval Diving and Salvage Training Center, Panama City Beach, FL B

13) Naval Undersea Warfare Center, Keyport WA (For NAVFAC Certified Hydrostatic Test Tank relief valves only).

Part B Private Companies

1) Epsilon Systems Solutions, Portsmouth, VA

2) Highstar Industrial Technologies, Portsmouth, VA

3) Marine Services, San Diego, CA

4) Tecnico, Panama City, FL

5) Emergency Ship Salvage Material Facility, Williamsburg, VA

Appendix (E)

NAVFAC Relief Valve Maintenance Document

RE-WRITTEN ENTIRELY BY REVISION A

NAVFAC SCA RELIEF VALVE MAINTENANCE DOCUMENT

1.0 FORWARD

This document was originally created because American Society of Mechanical Engineers (ASME) Relief Valves are not allowed to be repaired or set by Non-ASME qualified facilities. Prior to this new policy, per ASME Code, the only authorized repair/testing facilities for these valves were those that obtained an ASME stamp. The NAVFAC Boiler Inspectors disallowed all Navy government facilities from performing this work. Many had thought that this was a flawed policy, without merit. However, the NAVFAC Systems Certification Authority (SCA) subsequently discovered that the NAVFAC Senior Boiler Inspector, and other Inspectors, had numerous examples where incorrect repairs and unauthorized configuration changes resulted in catastrophic failures of pressure vessels, albeit mostly fired pressure vessels (boilers) versus unfired pressure vessels (flasks). Therefore for this policy change it became necessary to create a maintenance document (under the control of the NAVFAC SCA) that would collect enough Objective Quality Evidence (OQE) that would provide emphasis (with signatures) such that no changes to relief valve configurations will occur. The form also ensures Diver Life Support System (DLSS) cleanliness requirements are met. Existing forms such as Joint Fleet Maintenance Manual forms and others have been reviewed to determine if they could satisfy NAVFAC requirements. The existing forms have been found insufficient with regard to meeting all shore based NAVFAC SCA requirements. 20 March 2005 the first issue of this maintenance document was released. Since that time feedback from the field has been collected. This document has been revised in its entirety. To summarize this revision: Tolerances have been relaxed; Unmanned Systems have been added; Examples and Guidance has been added; Data Collection Form has been adjusted.

2.0 APPLICABILITY

This document is required for all ASME relief valves that protect ASME pressure vessels. Use of this document for other relief valves, such as system relief valves is optional.

3.0 REQUIREMENTS

Scope Of Certification (SOC) and Re-Entry Control (REC) requirements apply. For Unmanned Pressure Test Facilities (UPTF) a controlled work package is allowed as a REC substitute. The relief valve may or may not be an ASME[1] relief valve. Regardless who performs the work, only in-kind replacement of internal piece parts is authorized. A repair such as replacement of pressure boundary piece parts is not authorized. No configuration changes of any kind are allowed as such changes could negatively impact the relief valve flow capability. Questions regarding SOC or REC should be directed to the owner of this valve prior to proceeding. If owners have questions contact the NAVFAC SCA

4.0 GENERAL NOTES

All data observed during the test must be regarded as significant. If sufficient space is not provided on this test procedure for recording required data, it shall be made on an attachment to this document. Completed test specifications shall be completely filled in, dated, signed, and/or initialed at each entry. If certain data called for was not recorded, an entry should be made explaining the missing information.

[1] An ASME relief valve can be identified by a unique "V" stamp on it's label plate.

5.0 INSTRUCTIONS

5.1 BLOCK A TEST REQUIREMENTS

Block A of the Data Collection Form (see page 6) shall be completed by the relief valve owner. This block shall communicate all necessary requirements to the facility performing the testing. Accuracy of this block is critical to ensure proper testing. A mistake made in this block will likely result in improper relief valve setting and/or loss of cleanliness. While there is only one signature required for this block, the SCA highly recommends a two party review of the information prior to shipping the valve. The following guidance and examples are provided.

5.1.1 MAWP vs MSOP

There has been ongoing confusion with regard to the 110% setting of relief valves and the two terms Maximum Allowable Working Pressure (MAWP) and Maximum System Operational Pressure (MSOP)). MSOP is the highest system operational pressure under normal operational conditions. MSOP is typically the required system tightness test pressure. MAWP is the highest pressure the component is designed for. Normally MAWP (design or rated pressure) is stamped on the component or vessel, or listed in a component specification. For a typical NAVFAC recompression chamber MAWP is 110 PSI while the MSOP is 100 PSI. While most everyone understands that DLSS relief valves should be set to 110% of MSOP, it is often misunderstood that this setting must never exceed MAWP. Within the population of NAVFAC certified systems a small number of flasks, man-rated chambers and unmanned pressure test chambers exist, where the original design did not ensure that the vessel had an MAWP≥110% of MSOP. When this is found, special guidance is necessary. Typical guidance in this special case is Set Pressure = MAWP +0/-2%. There may be cases where reseat pressure must be allowed to fall below MSOP when the set pressure is < 110% of MSOP. If this is required, and the owner is uncertain or concerned about impact upon mission capability, contact the SCA. Owners of charging systems shall take note of the following: MIL-F-22606 Class 5000 flasks were designed to be installed in a 4500 PSI MSOP system. The relief valve for these flasks cannot be set above 5000 PSI because the MAWP for these flasks is 5000 PSI. In other words you cannot build a 5000 PSI charging system using MIL-F-22606 flasks.

5.1.2 EXAMPLES AND TOLERANCES

Numerous facility operators have decided to utilize this document for all of their relief valves. Thus the following includes guidance for system valves. For NAVFAC Shore Based Systems, the tolerance for set pressure (lift) shall be ± 5%. Navy PMS and TopSide Tech Notes currently identify 108-112 % which is ± 4% of lift. NAVFAC Systems require 5% because NAVFAC Systems have a large number of valves that have been designed and tested by Original Equipment Manufacturer (OEM) specifications using ± 5%. One such OEM example is Fluid Mechanics. Relief valves manufactured by Fluid Mechanics have been installed in nearly all newer NAVFAC systems. The tolerance for reseat shall be 10% and shall be ≧ MSOP. Water system (UPTF) are allowed 25% and allowed to fall below MSOP. Once again this is the specification used by Fluid Mechanics. This is also allowable as these are not man rated systems. The following generic examples are given:

Example 1 Chamber Relief where MSOP is 100 PSI, Chamber MAWP is 110 PSI. Relief shall be set at 110 PSI. Tolerance on lift shall be + 0 – 6 PSI. Reseat ≥ 100 PSI.
Example 2 Volume Tank Relief where MSOP is 125 PSI, Tank MAWP is 150 PSI. Relief shall be set at 138 PSI. Tolerance on lift shall be ± 7 PSI. Reseat ≥125 PSI.

Example 3 Pressure Reducing Station where MSOP is 250 PSI, lowest system component MAWP is ~ 300 PSI (Typically MAWP would be much greater but 300 PSI is chosen here for illustration). Set pressure would be 275 PSI. Tolerance on lift shall be ± 14 PSI. Reseat ≥ 250 PSI.

MSOP (PSI)	SET PRESSURE (PSI)	LIFT TOLERANCE (PSI) (Not to exceed MAWP)	RESEAT (PSI)
100	110	110 +0 – 5	≥100
125	138	138 ±7	≥125
250	275	275 ±14	≥250
3000	3300	3300 ±165	≥3000
5000	5500	5500 ± 275	≥5000
15800	16000	16000 ± 800	≥12000 (See Note)

Note - UPTF example. Water reseat tolerance is 25% of set pressure, or as identified by OEM.

5.2 BLOCK B VISUAL INSPECTION

This block shall be completed by the testing facility. Record the nameplate data of the relief valve being tested. Verify manufacturer and model/part number matches what the owner specified in Block A. Verify relief valve is complete and has no visible damage. Do not disassemble the relief valve for this inspection. Check for nicks, cracks, burrs and other visible damage.

5.3 BLOCK C CLEANLINESS/CLEANING

This block shall be completed by the testing facility. The purpose is to ensure valve meets cleanliness requirements (specified in Block A), in the as received condition. This also provides confidence that the valve is not going to contaminate the test facility and that the test facility is not going to contaminate the valve. Disassembly is not required. While most unmanned certified systems, such as hydro test tanks only require good shop practice, some medical research systems may specify the DLSS cleanliness requirements.

5.4 BLOCK D TEST SET-UP AND GAGE INFO

This block shall be completed by the testing facility. The set-up presented is considered generic. The purpose is to further ensure cleanliness is maintained by capturing the test medium used and to ensure correct gages are used. The intent is to ensure a relief valve lift pressure of 110 PSI is not verified by using a 0 – 10,000 PSI gage with a 2" dial size (as an example). Therefore, as guidance, gauges used shall be 4 ½ inch or larger dial size, accuracy of 1% full scale or better, and the full range of the pressure gauge shall be 130% to 150% of the pressure being measured. Digital instruments, such as King Nutronics Model 3194, are acceptable as long as they have been

periodically calibrated to a traceable standard that meets the requirements of the National Institute of Standards and Technology (NIST).

5.5 BLOCK E IN-SERVICE OPERATIONAL TEST

This block shall be completed by the testing facility. This block is to collect information regarding how well this valve would have performed if it were called upon to relieve pressure during an abnormal over pressurization incident. The purpose of recording the first crack and reseat of this valve is to see if any change in the set pressure has occurred. Required crack and reseat pressure can be obtained from Block A. Relief valve shall be installed in a test set-up functionally similar to Block D. Ensure all test components are appropriately rated for test pressure and that the regulated pressure source has overpressure protection. Open valve V-2 and slowly apply pressure until valve cracks open. Record the in-service cracking pressure (G-1) in the appropriate space. Increase pressure sufficiently to fully unseat the relief valve and then slowly decrease the pressure until reseat occurs. Shut valve V-2. Record the in-service reseat pressure in the appropriate space. If the cracking pressure is incorrect as specified in Block A, valve must be adjusted until the correct pressure range is attained. Record in remarks if any adjustments are made and indicate briefly what type of adjustment (ie ¼ turn clockwise). If adjustment is successful, proceed to Block F. If settings cannot be achieved, then the valve will need to be disassembled and repaired. If this is required proceed to Block G.

5.6 BLOCK F OPERATIONAL TEST

This block shall be completed by the testing facility. Required crack and reseat pressure can be obtained from Block A. Open valve V-2 and slowly apply pressure until valve cracks open. Record the cracking pressure (G-1) in the appropriate space. Increase pressure sufficiently to fully unseat the relief valve and then slowly decrease the pressure until reseat occurs. Shut valve V-2. Record the reseat pressure in the appropriate space. Test the cracking and reseat pressure points two additional times by repeating the operational test. While there is a tolerance on lift and reseat pressures, there isn't a specified tolerance on repeatability. To the maximum practical extent, the pressures recorded from test 1 through 3 should be the same. As guidance pressures should be within 0.5% or as recommended by the original manufacturer. If repeatability cannot be demonstrated the valve needs to be repaired.

5.7 BLOCK G RELIEF VALVE REPAIR

This block shall be completed by the testing facility. Configuration changes are not authorized. Only in-kind replacement of internal pieces including softgoods is allowed. Details of necessary repairs are to be captured in this block. List all pieces and work performed (Add sheets if necessary). Upon completion of this block, complete Block F prior to completing Block H

5.8 BLOCK H SEAT TIGHTNESS TEST

This block shall be completed by the testing facility. The purpose is to ensure that a repaired valve does not leak prior to shipment. Seat tightness testing must be conducted with the correct test fluid. If the valve was removed from a helium or helium-oxygen system it must be tested with helium. Air, nitrogen, or oxygen systems can be tested with clean oil free nitrogen, clean diver's quality air, or helium. Water valves water valves shall be tested with clean water. The following requirements shall apply.

5.8.1 AIR, NITROGEN, OXYGEN SYSTEMS

Using Block D set-up, apply pressure until the relief valve cracks open, then slowly decrease the pressure until reseat occurs. Monitor pressure for 3 minutes minimum. No leakage allowed, unless testing with helium where the 0.6 cc per minute leakage applies and duration may need to be adjusted.

5.8.2 HELIUM AND HELIUM-OXYGEN SYSTEMS

Using Block D set-up, apply helium pressure until the relief valve cracks open, the slowly decrease the pressure until reseat occurs. Monitor pressure for 5 minutes minimum. Only 0.6 cc per minute leakage past the seat is allowed. One method to measure acceptable leakage is to connect tubing to the outlet of the valve and place the outlet of the tubing into the underside of a water filled inverted graduated beaker. Displacement of water within the beaker will measure leakage when timed by stopwatch. Optional methods are acceptable if properly documented.

5.8.3 WATER SYSTEMS

Using Block D set-up, apply water pressure until the relief valve cracks open, then slowly decrease the pressure until reseat occurs. Monitor pressure for 3 minutes minimum. No leakage allowed.

5.9 BLOCK I BODY JOINT TIGHTNESS

This block shall be completed by the testing facility. During Block H seat tightness testing, monitor any body joints disturbed during valve repair. For gas use leak detection compound to prove joint is bubble tight. For water verify no signs of visible leakage. If failure of this test requires disassembly, Block F through Block H must be redone.

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NOTE

Anyone completing any portion of this Data Collection Form shall first read and understand the instructions. Failure to comply with the instructions could compromise certification.

BLOCK A TEST REQUIREMENTS:

Relief Valve Owner / Requesting Facility _____
Point of Contact / Phone Number _____

Check Type of Certified System: _____Manned DLSS _____Unmanned Pressure Test

System Valve Number _____ (i.e. AHP 1-1)

Manufacturer: _____ Model/Part Number _____

Specify level of cleanliness: _____DLSS MIL-STD-1622 _____DLSS MIL-STD-1330

_____Good Shop Practice (UNMANNED/Clean H2O)

Normal System Fluid _____ Air _____ Helium _____Helium-Oxygen _____ Oxygen

_____N2 _____H2O Other Specify _____

MSOP: _____PSI Set Pressure: _____PSI Lift Tolerance _____PSI Reseat ≥ _____

After successful testing ship to Address provided → _____

_____

_____

_____

Print Name _____ Signature/Date _____

BLOCK B VISUAL INSPECTION:

Manufacturer: _____ Model/Part No. _____

Serial No. _____ Visual Inspection is SAT____ UNSAT____

Print Name _____ Craftsman Signature/Date _____

BLOCK C CLEANLINESS/CLEANING:

Cleanliness IAW MIL-STD-1622 or MIL-STD-1330 Per REC may be required. Test Set-up of Block D must meet requirements.

Cleaning Standard _____ MIL-STD-1622 _____ MIL-STD-1330 _____ Good Shop Practice UNMANNED/Clean H20

Cleaning/Cleanliness is : SAT_____ UNSAT_____

Print Name _____ Craftsman Signature/Date _____

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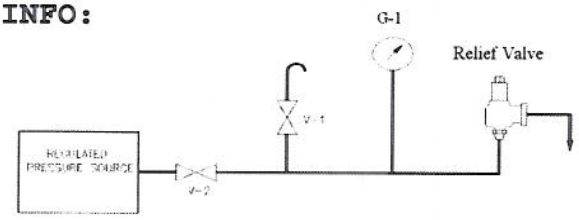
BLOCK D **TEST SET-UP AND GAGE INFO:**



Test Medium Used_____
(i.e. - Dry Oil Free N2, Clean H2O etc)

Gage Range_____ Gage S/N_____ CAL Due Date_____

Print Name_____ Craftsman Signature/Date _____

BLOCK E **IN-SERVICE CRACK AND RESEAT:**

In-Service Cracking Pressure _____ PSI In-Service Reseat Pressure _____ PSI

Adjustments Made: Yes____ No_____ Remarks _____

_____

Print Name_____ Craftsman Signature/Date _____

BLOCK F **OPERATIONAL TEST:**

Test	1st Test	2nd Test	3rd Test
Cracking Press (PSI)			
Reseat Press (PSI)			

Note: Following completion fabricate a metal tag that contains valve P/N, serial No, date tested; set pressure; and associated REC no. Install tag on the valve with lockwire.

Print Name_____ Craftsman Signature/Date _____

BLOCK G **RELIEF VALVE REPAIR:**

Reference(s)_____

Piece Parts Replaced_____

_____
(Note - Attach Certificates of Conformance and/or Procurement Documentation for Parts Replaced)

Repairs Performed_____

Cleanliness Per Block C Maintained Yes____ No____
(Note - Attach packaging from softgoods (O-rings, Teflon seats, etc) with evidence of cleaning).

Remarks_____

Print Name_____ Craftsman Signature/Date _____

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BLOCK H **SEAT TIGHTNESS TEST:**

Upon reassembly, perform operational testing per Block F of this document. After completion of Block F the following shall be accomplished.

For Air, Nitrogen or Oxygen reference paragraph 5.8.1

Reseat Pressure_____ PSI (Reseat Pressure = Block A requirements)

Test Duration_____ Minutes (3 Minutes Minimum)

Seat Tightness Test Is SAT_____ UNSAT_____

For Helium And Helium-Oxygen Systems reference paragraph 5.8.2

Reseat Pressure_____ PSIG (Reseat Pressure = Block A requirements)

Time @ Start_____ Time @ End_____ (24 Hour Clock 5 Minutes Min)

Graduated Beaker @ Start_____ml Graduated Beaker @ End_____ml

$$\text{Leakage} = \frac{\text{Difference in Beaker Readings (ml)}}{\text{Time Difference (min)}} = \_\_\_\_\_ \text{ cc/min.}$$

Remarks_____
(Optional methods may not include monitoring a gage, where 0.6 cc/min is not quantifiable. Other methods may include maintaining a meniscus bubble over the outlet of the piping for the duration).

Optional Method Remarks_____

For Water Systems reference paragraph 5.8.3

Reseat Pressure_____ PSI (Reseat Pressure = Block A requirements)

Test Duration_____ Minutes (3 Minutes Minimum)

Seat Tightness Test Is SAT_____ UNSAT_____

Print Name_____ Craftsman Signature/Date _____

BLOCK I **BODY JOINT TIGHTNESS TEST:**

During the Block H seat tightness test, monitor any body joints disturbed during valve repair in accordance with paragraph 5.9.

Body Joint Tightness Test is SAT _____ UNSAT _____

If UNSAT and disassembly is required to repair, Block F through Block H must be redone.

Print Name_____ Craftsman Signature/Date _____