[INCH-POUND]
F-V-2906
June 12, 1997
SUPERSEDING
MIL-V-18499E
4 October 1985

FEDERAL SPECIFICATION

VALVES, AIR VENTING, STEAM

The General Services Administration has authorized the use of this specification by all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers valves for automatically venting air from mains in steam heating systems.

1.2 Classification. Valves shall be one of the following types and classes, as specified (see 6.2):

Type I - Without vacuum holding device.
Type II - With vacuum holding device.

Class 1 - Low pressure - up to 15 pound-force per square inch gage (psig) (103.4 kilopascal (kPa)).
Class 2 - Medium pressure - 16 to 65 psig (110.3 to 448.2 kPa).
Class 3 - High pressure - 66 to 125 psig (445.1 kPa to 861.8 kPa).

2. APPLICABLE DOCUMENTS

2.1 Government publications. The following documents, of the issues in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: Commanding Officer (Code 15E2), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

Federal Standard

FED-STD-H28 - Screw-Thread Standards for Federal Services Section 7 Pipe Threads - General Purpose

(Copies of federal standard required by contractors in connection with specific procurement functions are obtained from the Defense Automated Printing Services, Attn: DoDSSP, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI - Z1.4 Sampling Procedures and Tables for Inspection by Attributes.

(Private sector and civil agencies may purchase copies of these voluntary standards from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.)

MANUFACTURERS STANDARD SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-25 - Standard Marking System for Valves, Fittings, Flanges and Unions.

(Private sector and civil agencies may purchase copies of these voluntary standards from the Manufacturers Standardization Society of the Valve and Fittings Industry, Inc., 127 Park Street, NE, Vienna, VA 22180.)

(DoD activities may obtain copies of those adopted voluntary standards listed in the DoD Index of Specifications and Standards free of charge from Defense Automated Printing Services, Attn: DoDSSP, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The type I air venting valve shall consist of a body, float, thermostatic element, vent, valve needle, and seat. The type II air venting valve shall consist of a body, float-thermostatic element or thermostatic element, vent, valve needle, seat, and a vacuum holding device.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.1.

3.3 Standard commercial product. The valve shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product, shall be included in the valve being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.4 Interchangeability. All valves of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to ensure interchangeability, provided form, fit, and function requirements are satisfied.

3.5 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification.

3.6 Design. The air venting valves shall be designed for use on steam systems where both steam and condensate may be present. The valves shall be designed to vent air from the steam mains and return lines and to close automatically against steam or condensate. Class 2 and 3 valves will close against condensate if it is above 10 degrees Fahrenheit (°F) (17.8 degrees Celsius (°C)) below saturation temperature for a respective pressure. Type II valves shall also be designed to prevent the return of air through the valve to the system when under vacuum. The design of the valves shall be such as to prevent conditions hazardous to personnel. Threads shall be in accordance with FED-STD-H28. The drop-away pressure (valve operating pressure), as specified herein, shall be interpreted as the maximum pressure at which the valve will function (open and close) to relieve air. For class 1 valves, the drop-away pressure shall be not less than 2 psig (13.8 kPa). Unless otherwise specified (see 6.2), for class 2 and class 3 valves, the maximum pressure at which the valve will function (open) to relieve air, shall be in accordance with the manufacturer's standard practice. In addition, valves shall be designed to withstand the maximum system steam pressure of 15, 65, or 125 psig, (103.4, 448.2, or 861.8 kPa) as applicable, without affect on the operation of the valve when the system pressure falls to the specified drop-away pressure.

3.7 Performance. The valves shall be capable of eliminating air from steam systems up to the applicable drop-away pressure specified in 3.6 without leakage or chattering. Valves shall close

against the surges of condensate into the valve to prevent escape of condensate. When the condensate recedes, the valve port shall open. When displacement of air with steam occurs, the thermostatic element of the valve shall respond to close the port and prevent escape of the steam or condensate. The valve operating cycle, for type I valves, shall repeat whenever the pressure in the system falls to the specified drop-away pressure and air has been inducted into the system.

3.7.1 Capacity. The air capacity of the valves furnished under this specification shall be established in accordance with one of the following options, as exercised by the acquiring activity in the contract or order (see 6.2):

a. Capacity, in volume of air per minute at the specified pressure differential, and at standard conditions (14.7 pound-force per square inch (101.3 kPa) atmospheric pressure absolute, 60°F (15.6°C)).

b. Capacity to be the manufacturer's standard published rating for valves having the connection size specified in 3.8.1.

3.8 Construction.

3.8.1 Body. The body shall be of cast iron (class 1 only), cast steel, cast brass, steel or brass forging, drawn steel or drawn brass at the option of the contractor unless a particular body material is specified (see 6.2). The body shall be of the vertical pattern. Unless smaller sizes are specified (see 6.2), class 1 and class 2 valves shall be furnished with either 0.75-inch (20 millimetre (mm)) male connections or 0.75-inch (20 mm) male by 0.50-inch (13 mm) female connectors. Connection sizes for class 3 valves shall be as specified (see 6.2). Connections shall be threaded with American Standard taper pipe threads, in accordance with FED-STD-H28.

3.8.2 Float. The float shall be bell, ball, or cylindrically shaped and shall be fabricated of nonferrous metal. Inverted, open type floats may be used for class 2 and class 3 valves, at the option of the manufacturer. All floats shall be sized and arranged to prevent discharge of condensate.

3.8.3 Thermostatic element. The thermostatic element may be integral with the float, or a separate diaphragm or bellows may be used in conjunction with the float. The thermostatic element shall operate by pressure variations of a temperature-activated medium sealed inside the element to expand and close the port when steam enters the valve, and to contract and open the port when cooling occurs.

3.8.4 Vent. The vent shall be located in the highest part of the valve body and shall be of the nonadjustable design.

3.8.5 Valve needle and seat. The valve needle and seat shall be of corrosion-resistant material. The seat shall be designed to insure proper seating of the valve needle.

3.8.6 Vacuum holding device. Type II valves shall be equipped with a suitable automatic device for holding the vacuum. The device shall operate quickly and effectively during the formation of the vacuum, and shall hold a seal for vacuums normally encountered in tight, one-pipe, vapor-vacuum systems. The device shall release without sticking when the pressure in the system rises above zero psig (zero kPa).

3.9 Finish. The exterior surfaces of the valves fabricated with brass bodies may be the natural finish produced by the casting, forging, or drawing process, or may be plated. Exterior surfaces of valves with cast iron or steel bodies shall be treated and painted or plated in accordance with the manufacturer's standard practice. When specified (see 6.2), exterior surfaces shall be chromium-plated or nickel-plated.

3.10 Identification marking. Each valve shall be marked in accordance with MSS SP-25.

3.11 Workmanship.

3.11.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a valve less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.11.2 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect which reduces the castings ability to perform its intended function.

3.11.3 Bolted connections. Bolt holes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification, where such inspections are deemed necessary to ensure that supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 3. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain

conformance to requirements. However, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.2.1).
b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one valve, when a first article is required (see 3.2 and 6.2). This inspection shall include the examination of 4.4 and the tests of 4.5. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, material, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.2.2 *Quality conformance inspection.* The quality conformance inspection shall include the examination of 4.4 and the tests of 4.5. This inspection shall be performed on the samples selected in accordance with 4.3.

4.3 Sampling. Sampling and inspection procedures shall be in accordance with ANSI - Z1.4. The unit of product shall be one valve. All valves offered for delivery at one time shall be considered a lot for the purpose of inspection. Guidance for inspection level and Acceptable Quality Level (AQL) is provided in 6.3.

4.4 Examination. Each valve shall be examined for compliance with the requirements specified in section 3 of this document. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.5 Tests.

4.5.1 Hydrostatic test. Valve bodies shall be tested hydrostatically, pneumatically, or with steam to a pressure 50 percent above the maximum rated system steam pressure (see 1.2).

4.5.2 Operation test. Type I and type II valves shall be tested both with saturated steam and condensate to determine conformance to 3.6 and 3.7. During the tests the valve shall effectively

prevent the discharge of steam or condensate through the vent port, and shall be closed at rated pressure during the steam test.

4.5.3 Vacuum test. Type II valves shall also be tested under specified vacuum conditions. Valves shall be capable of allowing the vacuum to form, of holding the vacuum, and of opening readily when the pressure rises above zero psig (zero kPa).

5. PACKAGING

5.1 Packaging requirements. The preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES

(This section contains information of a general or explanatory nature which is helpful, but is not mandatory.)

6.1 Intended use. The air-venting valves covered by this specification are intended primarily for venting mains in one-pipe-and two-pipe gravity steam heating systems. The valves may also be used for venting unit heaters and systems supplying steam to process equipment, and steam-heated galley equipment. Type I valves are used in systems operating at or above atmospheric pressure. Type II valves are intended primarily for use in one-pipe vapor-vacuum systems. Class 3 valves are intended for special applications not associated with gravity steam-heating systems.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and class required (see 1.2).
c. When a first article sample is required for first article inspection and approval (see 3.2 and 4.2.1).
d. When a specific drop-away pressure is required for class 2 and class 3 valves (see 3.6).
e. Valve capacity required (see 3.7.1).
f. When a particular body material is required (see 3.8.1).
g. When connection sizes smaller than 0.75-inch (20 mm) are required for class 1 and class 2 valves; connections required for class 3 valves (see 3.8.1).
h. When chromium- or nickel-plating is required (see 3.9).

6.3 Sampling procedures. Recommended inspection level is S-2 and an AQL of 4.0 percent defective (see 4.3).

6.4 Supersession data. This specification replaces Military Specification MIL-V-18499E dated 4 October 1985.

6.5 Classification cross reference. Classifications used in this specification (see 1.2) are identical to those found in superseded Military Specification MIL-V-18499E, dated 4 October 1985.

6.6 Part or Identifying Numbers (PINs). The specification number, type and class are combined to form PINs for valves covered by this document (see 1.2). The type and class of the valve are identified by a single digit number (see table I). PINs for the valves are established as follows:

FV2906 X

Federal Specification Number: FV2906

Type and class code number (see table I): X

TABLE I. Code number to type and class.

	Class I (Low pressure)	Class II (Medium pressure)	Class III (High pressure)
Type I (Without vacuum holding device)	1	2	3
Type II (With vacuum holding device)	4	5	6

6.7 Subject term (key word) listing.

Air venting
Drop-away pressure
Vacuum holding device

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to previous issue.

MILITARY INTERESTS:

Custodians:
Navy - YD1
Air Force - 99

Review Activity:
DLA - CS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-FSS

DOT - ACO
GSA - FCGC
GSA - PCT

PREPARING ACTIVITY:
Navy - YD1

(Project 4520-0394)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER F-V-2906	2. DOCUMENT DATE (YYMMDD) 970612

3. DOCUMENT TITLE
VALVES, AIR VENTING, STEAM

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON *(if applicable)*	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME G. M. KRALIK	b. TELEPHONE *(Include Area Code)* (1) Commercial 805 982-5741 (2) AUTOVON 551-5741
c. ADDRESS *(Include Zip Code)* COMMANDING OFFICER, NCBC CODE 15E2R 1000 23RD AVENUE PORT HUENEME, CA 93043-4301	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: DEFENSE QUALITY AND STANDARDIZATION OFFICE 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466 Telephone (703)756-2340 AUTOVON 289-2340