

F-F-300B  
May 28, 1982  

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SUPERSEDING  
F-F-300A  
April 28, 1967

## FEDERAL SPECIFICATION

### FILTER, AIR CONDITIONING: VISCOUS IMPINGEMENT AND DRY TYPES, CLEANABLE

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers cleanable, metallic, panel type, standard velocity air filters used in air conditioning heating, and ventilating systems. The specification also covers tanks for washing and charging viscous impingement filters.

1.2 Classification. Filters shall be of the following types as specified (see 6.2.1).

Type I - Adhesive coated media; high capacity.  
Type II - Dry media; low capacity.

#### 2. APPLICABLE DOCUMENTS

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

##### Federal Specifications:

PPP-B-636 - Box, Shipping, Fiberboard.  
PPP-D-729 - Drums, Shipping and Storage, Steel, 55 Gallon (208 Liters).  
PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons).

##### Federal Standards:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

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(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

#### Military Specifications:

MIL-P-116 - Preservation, Methods of  
 MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible  
 MIL-C-52950 - Crates, Wood, Open and Covered

#### Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes  
 MIL-STD-129 - Marking for Shipment and Storage  
 MIL-STD-147 - Palletized Unit Loads  
 MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

(Copies of Military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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

#### American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Standards:

52 - Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter

(Application for copies should be addressed to the American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., 345 East 47th Street, New York, NY 10017.)

American Society for Testing Materials (ASTM) Standards:

- A167 - Stainless and Heating-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
- A176 - Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
- A366 - Steel Sheet, Carbon, Cold-Rolled Sheet, Commercial Quality
- A525 - Sheet Steel, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
- B209 - Aluminum-Alloy Sheet and Plate
- B633 - Electrodeposited Coatings of Zinc on Iron and Steel
- D92 - Flash and Fire Points by Cleveland Open Cup, Test Method for

(Application for copies should be addressed to the American Society for Testing of Materials, 1916 Race St., Philadelphia, PA 19103.)

Underwriters Laboratories (UL) Inc., Standards:

- UL900 - Test Performance of Air Filter Units

(Application for copies should be addressed to the Underwriters Laboratories, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.)

**3. REQUIREMENTS**

**3.1 Description.** The filters shall be of the permanent, flat, panel type. The filters shall be designed and fabricated to be cleaned for re-use when, because of accumulated dust loading, the pressure drop across the filter reaches the limit imposed by such factors as the filter capacity, the permissible reduction in air flow, or the performance characteristics of the air moving device. The filter media shall be metallic and dry or adhesive-coated in accordance with the type specified (see 1.2 and 6.2.1). Size of the media shall be as specified (see 6.2.1). Nominal thickness of the media shall be 4 inch, 2 inch, 1 inch, 3/4 inch or 1/2 inch, as specified (see 6.2.1).

**3.2 First article.** When specified (see 6.2.1), the contractor shall furnish one filter of the type specified for first article inspection and approval (see 4.3 and 6.3).

**3.3 Standard commercial product.** The filter 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 filters 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 Materials.** Material shall be suitable for intended use and shall be of the type specified herein, except that when options provided herein for material are exercised, the type of material shall be as specified (see 6.2.1). Materials for media and media frames shall conform to the following requirements as applicable.

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3.4.1 Carbon steel. Carbon steel sheet shall have properties equal to or better than the properties specified in ASTM A366 for commercial carbon steel sheets.

3.4.2 Zinc-coated steel. Galvanized and galvanized steel shall conform to ASTM A525. The weight of zinc-coating for galvanized steel media shall not be less than that specified in ASTM B633 for type SC-1 electroplated zinc-coated.

3.4.3 Aluminum. Aluminum shall be an alloy conforming to the requirements of ASTM B209. The alloy shall have mechanical properties, formability, and a surface finish suitable for the intended application.

3.4.4 Corrosion resistant steel. Unless otherwise specified (see 6.2.1), corrosion resistant steel shall conform to any of the 300- or 400-series of ASTM A167 or A176, as applicable.

3.4.5 Dissimilar metals. Joints between dissimilar metals, including bolts, nuts, rivets, and other fastenings and fittings shall be protected against galvanic corrosion by the proper selection of materials, plating isolation, insulation, area relationships or other means providing equivalent protection.

3.5 Fire and casualty hazards. Filters shall meet the fire-resistant requirements of UL900. Filters shall be either UL class 1 or UL class 2, at the option of the contractor, unless UL class 1 filters only are specified in the invitation for bids (see 6.2.1). Classifications under UL900 shall be interpreted as follows:

- (a) Class 1 - Filters which, when clean, do not contribute fuel when attacked by flame and emit only negligible amounts of smoke.
- (b) Class 2 - Filters which, when clean, burn moderately when attacked by flame or emit moderate amounts of smoke or both.

Adhesive coatings used on filters shall have a flashpoint of not less than 325° Fahrenheit (F) and shall conform to ASTM D92.

3.5.1 Certification. Prior to the approval of the sample filter furnished for first article inspection, if such inspection is specified, or prior to the first shipment, if first article is not required, the contractor shall submit evidence satisfactory to the contracting officer or his authorized representative that the filters to be furnished under this specification meet the UL standard cited in 3.5. Acceptable evidence of meeting the specified requirements herein shall be certificate of compliance (see 6.2.2), executed by an authorized official of the contractor stating that the items have been tested and that the units meet the requirements of the specified standards in 3.5, including specified methods of testing. Acceptable evidence that filters are in accordance with UL requirements will be the official UL listing mark or a certified test report (see 6.2.2) from a recognized independent laboratory acceptable to the Government indicating that the filter has been tested and conforms as applicable to the requirements for class 1 or class 2 filters.

Acceptable evidence that the adhesive coating meets the specified requirements will be a certified test report indicating that the adhesive has been tested in accordance with ASTM D92 and has a flash point not less than the value specified in 3.5.

**3.6 Performance.** Filter performance shall be in accordance with the requirements of Table I applicable to the type and thickness of filters being furnished. Performance shall be established on the basis of ASHRAE Standard 52.

**3.6.1 Initial resistance.** The initial resistance for clean filters shall not exceed 0.07 inch water gage (wg) at 350 feet per minute (fpm) face velocity.

**3.6.2 Average arrestance.** The average arrestance shall be not less than the applicable values specified in Table I. When the filter is operated to the maximum final resistance, 0.05 inch, wg.

**3.6.3 Dust holding capacity.** The minimum dust holding capacity shall be not less than the applicable values specified in Table I. The capacity shall equal the amount of the test dust acceptance per unit area of renewable media times its average arrestance.

TABLE I. Filter performance' requirements.

Type	Nominal thickness (inches)	Average Arrestance (%)	Dust holding capacity (grams per square foot of net face area)
I	1/2	55	40
	3/4	55	60
	1	60	80
	2	65	100
	4	65	120
II	1/2	55	25
	3/4	55	40
	1	60	50
	2	65	60
	4	65	75

**3.6.4 Cleanability.** The weight of clean filters after two dust loading and cleaning cycles may increase to a value not exceeding 35 percent of the total weight of dust fed to the filter at the final resistance specified in 3.6.3. (Actual filtration capacity in grams per square foot times net face area in square feet times 0.35.) The resistance across the filters after two dirt loading and cleaning cycles may increase by a value not exceeding 0.02 wg.

**3.7 Filter media.** Filter media shall be metal such as crimped wire screen woven mesh, metal stampings or plates, split or expanded, or any combination of these elements. The media shall be arranged in a manner to insure compliance with the performance requirements of 3.6. Unless otherwise specified (see 6.2.1), the material for the filter media shall be in accordance with the manufacturer's standard practice. When carbon-steel screen or mesh is used as the media, it shall be electroplated zinc-coated or the screen or mesh shall be woven of electrodeposited zinc-coated wire. In either case, electroplated zinc coatings shall conform to the requirements of 3.4.2.

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### 3.8 Construction.

3.8.1 Media frames. Media frames shall be constructed of carbon steel, galvanized or galvanealed steel, or aluminum at the option of the supplier unless one or more of these materials is definitely specified by the procuring agency (see 6.2.1). When specified (see 6.2.1), media frames for special applications in corrosive atmospheres shall be fabricated of corrosion-resistant steel specified in 3.4.4. Carbon steel frames shall be treated and painted in accordance with 3.10. Frames shall be constructed with 90-degree corners. The actual outside dimensions of the frame shall be such as to permit installation of the filter in holding frames having dimensions specified in 3.8.2. Frames of filters requiring adhesive treatment shall be provided with drain holes in such locations as to permit drainage when the filter is set on any one of its four sizes. The actual depth of the filter media (front to back) may be less than the nominal thickness specified (see 3.1) provided the filter meets the applicable performance requirements of Table I for the size specified and the media frame will fit into a channel or holding frame having a depth equivalent to the nominal filter thickness. Unless otherwise specified (see 6.2.1), material for media frames shall be of standard duty. Media frames shall conform to either of the following requirements:

- (a) Media frame material shall have a minimum thickness of not less than 0.035 inch (.09 cm) for steel and 0.038 inch (.097 cm) for aluminum (U.S. revised standard gage No. 20); or,
- (b) Media frames shall be so constructed to have structural integrity as to withstand the following shock corner drop. The filter unit shall be subjected to one free full drop on each of its corners. The filter unit shall be held by one corner and allowed to drop on the opposite corner. The impacting corner shall fall 36 inches (91.44 cm) on a concrete surface. The filter unit shall show no evidence of permanent distortion or other damage.

3.8.1.1 Media support. The media shall be attached to the frame in such a manner that the media will not slump or otherwise be permanently displaced under the applicable conditions of maximum air velocity and filter resistance specified herein. When required, media reinforcement in the form of grilles, grids, or equivalent media retainers shall be installed on one or both faces of the filter to prevent displacement of the media under the specified operating conditions. For type II filters, retainers for metallic wool media shall be expanded aluminum or cadmium plated steel unless copper wool media is specified, in which case the retainer shall be copper-plated.

3.8.2 Holding frames. When specified (see 6.2.1), each filter panel shall be furnished with a holding frame. Outside dimensions of the holding frame shall be the nominal dimensions specified (see 3.1). The manufacturer's standard tolerances shall apply. Holding frames shall be equipped with a device(s) suitable for securing in place any filter of similar thickness. Unless otherwise specified (see 6.2.1), holding frames shall be constructed of carbon steel not less than 0.0598 inch (U.S. revised standard gage No. 16) in thickness. Holding frames shall be furnished with gaskets, when required, to prevent bypassing of air around the media frame.

3.9 Adhesive oil. For type I filters, adhesive oil shall be water emulsifiable and of suitable viscosity to effect filtration at temperatures up to 150° Fahrenheit (F). Adhesive oil shall meet the requirements of 3.5. Instructions for cleaning filters and applying adhesive shall be furnished.



Unless otherwise specified (see 6.2.1), type I filters shall be shipped with the adhesive applied. When specified (see 6.2.1), extra adhesive oil shall be furnished with type I filters in the quantity specified.

3.9.1 Washing and charging tank. When specified (see 6.2.1), a washing and charging tank shall be furnished. The unit shall consist of a tank suitable for complete submergence of the filter units and a drainage section. The unit shall be leg-mounted and shall be furnished with a drain connection in the tank to permit reclamation of excess adhesive oil. The number and size of filters to be accommodated by the unit shall be as specified (see 6.2.1).

3.10 Treatment and painting. When carbon steel media frames and holding frames are furnished, they shall be treated and painted in accordance with the manufacturer's standard practice.

3.11 Marking. Each filter shall be marked with the following:

- (a) The name or tradename of the manufacturer or vendor.
- (b) A distinctive model number, catalog designation, or equivalent marking.

If a manufacture produces air-filter units of the same model at more than one manufacturing facility, each filter shall have a distinctive marking. Such markings shall identify the filter as the product of a particular facility and may be in code. Each unidirectional filter shall be plainly marked to show the direction of air flow.

#### 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 as specified herein. Except as otherwise specified in the contract or purchase order, 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 assure supplies and services conform to prescribed requirements.

4.2 Inspection classification. The inspection requirements specified herein are classified as follows:

- (a) First article inspection.
- (b) Quality conformance inspection.

4.3 First article inspection. First article inspection shall be performed on one filter unit when a first article sample is required (see 3.2 and 6.3). The first article shall be examined and tested in accordance with the following procedures to verify compliance with all design, construction, and performance requirements of this specification.

4.3.1 Examination. Filters selected for first article inspection shall be examined to verify compliance with the material and dimensional requirements of this specification and shall be further examined, as required, to establish that the sample is representative in design and construction of the remaining filters to be furnished under the contract. The manufacturer furnishing the first article sample shall provide (1) descriptive data or specification

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covering the filter construction, type and arrangement of media, the material and thickness of frames, and the type of adhesive, if used, and (2) the UL certification required under 3.5.1. The procuring agency shall review the submitted data to determine the acceptability of the sample for further first article testing.

4.3.2 Test procedures. Determination of average arrestance shall be made in accordance with ASHRAE Standard 52.

4.3.3 Initial resistance. The initial resistance of the clean filter shall be established prior to determination of the average arrestance of the sample filter.

4.3.4 Dust holding capacity. The dust holding capacity shall be reported in accordance with ASHRAE Standard 52.

4.3.5 Cleanability. The first article sample shall be tested to verify compliance with the cleanability requirements of 3.6.4. After the test of 4.3.4, the filter shall be cleaned by the method prescribed by the manufacturer, and, if the filter is normally adhesive-coated, reoiled with the same adhesive used during the loading of the filter. The filter shall then be reloaded up to the final resistance specified in 3.6.3, cleaned, and, if adhesive-coated, reoiled. The increase in weight and resistance shall not exceed the percentage increase specified in 3.6.4.

#### 4.4 Quality conformance.

4.4.1 In-process inspection. In-process inspection shall be performed on all filters submitted for acceptance and shall be in accordance with the manufacturer's established quality control program. The quality control program shall be subject to the surveillance of the procuring agency or authorized representatives thereof. The program shall assure that control of quality is maintained throughout all areas of contract performance, including the receipt and identification of material, the manufacturing processes, and the final assembly of the filter units furnished.

4.4.2 End-product examination. Filters shall be examined for conformance with the material, dimensional, and marking requirements of this specification.

4.4.2.1 Material inspection. The filter manufacturer will not be required to perform tests necessary to verify compliance with the referenced standards applicable to metallic materials. In lieu of tests, the filter manufacturer in accordance with 4.4.1, shall exercise adequate control of the procurement, receipt, identification, and application of all materials used in the fabrication of filters.

4.5 Certification of conformance. When specified on contracts not requiring a first article (see 6.2.1), the supplier shall submit to the procuring agency a report indicating that the filter(s) to be furnished complies with the performance and cleanability requirements of this specification. Tests shall have been conducted in accordance with the requirements of 4.3 except that the test filter need not necessarily be selected from filters to be furnished under the contract or from the manufacturer's current inventory of filter units. The filter tested shall, however, be representative of the design, performance, and manufacturing techniques applicable to the filters being furnished under the contract. The manufacturer shall also furnish (1) descriptive data or specifications



covering the filter construction, type and arrangement of media, material and thickness of frames, and type of adhesive, if used and (2) the certification of compliance with UL900 required under 3.5.1.

4.6 Preparation for delivery inspection. An examination shall be made to determine compliance with the requirements of section 5. The sample unit shall be one unit prepared for shipment. Sampling shall be in accordance with MIL-STD-105. The inspection level shall be S-2 with an AQL of 4.0 percent defective.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or commercial, as specified (see 6.2.1).

5.1.1 Level A. Each filter shall be preserved and packaged method III in accordance with MIL-P-116. Type I filters shall be wrapped with barrier material conforming to MIL-B-121, Grade A, and secured with tape. Type II filters shall be wrapped with kraft paper and secured with tape. After wrapping, each filter shall be individually packaged in a fiberboard box conforming to PPP-B-636, class weather-resistant. Closure and waterproof sealing of the boxes shall be method V in accordance with the appendix to PPP-B-636.

5.1.2 Commercial. Each filter shall be preserved and packaged in a manner to prevent deterioration and damage during shipment.

5.2 Packing. Packing shall be level A, B, or commercial, as specified (see 6.2.1).

### 5.2.1 Levels A and B.

5.2.1.1 Filters. The filters (of one type) shall be packed in a box selected from Table I of MIL-STD-794 for the appropriate level.

5.2.1.2 Adhesive oil. The adhesive oil shall be furnished in 19-liter (5-gallon) or 208-liter (55-gallon) quantities, as specified (see 6.2.1). The 19-liter (5-gallon) quantity shall be packed in a pail conforming to PPP-P-704, type I, with spout or nozzle. The 208-liter (55-gallon) quantity shall be packed in a drum conforming to PPP-D-729, type II or IV.

5.2.1.3 Washing and charging tank. The tank shall be packed in a crate conforming to MIL-C-52950, type III. A shroud shall be provided in accordance with the crate specification.

5.2.2 Commercial. The filters (of one type), oil, and tanks shall be packed in a manner which will insure arrival at destination in a satisfactory condition. Containers and packing shall comply with applicable carrier rules and regulations.

5.3 Palletization. When specified (see 6.2.1), the oil containers shall be palletized in accordance with MIL-STD-147.

5.4 Marking. When specified (see 6.2.1), unit and shipping containers shall be marked in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies, in addition to any special marking required by the contract or order.

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## 6. NOTES

6.1 Intended use. Filters covered by this specification are intended for use in ventilation, air conditioning and heating systems to remove particulate matter found in the atmosphere.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2 and 3.1).
- (c) Size of the media required (see 3.1).
- (d) Thickness of the media required (see 3.1).
- (e) When a first article is required (see 3.2).
- (f) When particular materials are required for media frames or media (see 3.4, 3.4.4, 3.7, and 3.8.1).
- (g) When Underwriter's Laboratories class 1 filters only shall be furnished (see 3.5).
- (h) Duty of material for media frames if other than as specified (see 3.8.1).
- (i) When holding frames are required and type of material (see 3.8.2).
- (j) When viscous-impingement filters are to be shipped dry (see 3.9).
- (k) When extra adhesive oil is to be supplied and the quantity required (see 3.9 and 5.2.1.2).
- (l) When a washing and charging tank is to be furnished and the capacity (number and size of filters) required (see 3.9.1).
- (m) When a certificate of conformance is required (see 4.5).
- (n) Level of preservation, packaging, and packing required (see 5.1 and 5.2).
- (o) If extra adhesive oil is specified, whether 19-liter (5-gallon) or 208-liter (55-gallon) containers are required (see 5.2.1.2).
- (p) When palletization for oil containers is required (see 5.3).
- (q) Whether civil or military marking of containers is required (see 5.4).

6.2.2 Contract data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423 and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulation (DAR), the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data specified below shall be delivered in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

<u>PARAGRAPH</u>	<u>DATA REQUIREMENTS</u>	<u>APPLICABLE DD-1664</u>
3.5.1	Certificate of Compliance	DI-E-2121
3.5.1	Reports, test	DI-T-2072

6.3 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of paragraph 7-104.55 of the DAR. The first article should be a first production item consisting of one complete filter unit or it may be a standard production item from the

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contractor's current inventory as specified in 4.2.1. The contracting officer should include specific instructions in all acquisition instruments regarding arrangement for examinations, tests, and approval of the first article.

6.4 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

6.5 Classification change. The classification of filters in this document differs from the superseded specification in the following respects.

F-F-300A

Type I  
Type II  
Type III  
Type IV  
Type V  
Type VI  
Type VII  
Sizes

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Type I  
Deleted  
Type II  
Deleted  
Deleted  
Deleted  
Deleted  
Deleted

## MILITARY CUSTODIANS:

Navy - YD  
Air Force - 99

Review Activities

Navy - MC, CG, SH

User Activity:

Army - ME

## CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS  
TRANS - ACO  
COM - NBS  
NASA - JFK

## PREPARING ACTIVITY:

Navy - YD

Project No. 4130-0234

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Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.