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February 23, 1989
 SUPERSEDING
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FEDERAL SPECIFICATION

FRAMES, COVERS, GRATINGS, STEPS, SUMP AND CATCH BASIN, MANHOLE

This specification is 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 manhole and catch-basin frames, gratings, steps, sumps, and catch basins for access purposes.

1.2 Classification.

1.2.1 Manhole frames, catch-basin frames, covers, and gratings. The manhole frames, catch-basin frames, covers, and gratings will be of the following types and styles, indicated in the following figures, as specified (see 6.2).

<u>Frames</u>	<u>Figures</u>
Type I - Straight traffic frame.	
Style A - Round-base frame.	1
Style B - Square-base frame.	1
Type II - Straight traffic frame for inner covers.	
Style A - Round-base frame.	2
Style B - Square-base frame.	2
Type III - Flared traffic frame.	
Style A - Round-base frame.	3
Style B - Square-base frame.	3
Type IV - Nontraffic frame.	4
Type V - Ring-type frame.	5
Type VI - Catch-basin frame.	6
Type VII - Sump frame.	7

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 5680

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<u>Covers and gratings</u>	<u>Figures</u>
Type A - Manhole covers, traffic.	8
Type B - Manhole cover, traffic.	9
Type C - Manhole covers, traffic, with vent holes	10
Type D - Manhole cover, traffic.	11
Type E - Manhole cover, nontraffic frame.	12
Type F - Manhole gratings.	
Style 1	13
Style 2	13
Type G - Catch-basin gratings.	
Style 1	14
Style 2	14
Type H - Manhole grating, nontraffic.	15
Type I - Sump grating.	16

1.2.2 Inner covers. Inner covers, for use with type II frames, will be the manufacturer's standard type inner cover. Figure 17 is included as a guideline to the desired configuration.

1.2.3 Locking bars. Locking bars, for use with type II frames and inner covers, will be the manufacturer's standard type locking bar. Figure 18 is included as a guideline to the desired configuration.

1.2.4 Manhole steps. Manhole steps covered by this specification will be either the conventional type as shown in figure 19 or nonsparking type as specified in 3.10.2.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Federal Standards

FED-STD-H28 - Screw Thread Standards for Federal Services
 FED-STD-123 - Marking for Shipment (Civil Agencies)

(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.)

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(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 Standard

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

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

2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents which is current on the date of the solicitation (see 6.2).

American Society for Testing and Materials (ASTM)

ASTM A 27 - Steel castings, carbon, for general application
 ASTM A 48 - Gray Iron Castings
 ASTM A 220 - Pearlitic Malleable Iron Castings
 ASTM A 536 - Ductile Iron Castings
 ASTM E 709 - Magnetic Particle Examination
 ASTM D 3951 - Magnetic Particle Examination

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

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.4).

3.2 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

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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 are allowed under this specification.

3.2.1 Cast iron. Cast iron shall conform to the requirements of ASTM A 48, class 30B, as a minimum.

3.2.2 Cast steel. Cast steel shall conform to the requirements of ASTM A 27, grade 60-30, as a minimum.

3.2.3 Malleable cast iron. Malleable cast iron shall conform to the requirements of ASTM A 220, grade 50005, as a minimum.

3.2.4 Ductile iron. Ductile iron shall conform to the requirements of ASTM A 536, grade 65-45-12, as a minimum.

3.3 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.4 Frames. Frames shall be of the general configurations shown in figures 1 through 7. Unless otherwise specified (see 6.2), frames shall be cast iron conforming to 3.2.1.

3.5 Covers. Covers shall be of the general configurations shown in figures 8 through 12 and figure 17 except for those variations permitted herein. Unless otherwise specified (see 6.2), covers shall be cast iron conforming to 3.2.1.

3.5.1 Ribbing. Covers may be furnished with ribbing design other than that indicated on the figures, provided they meet the load bearing requirements of this specification.

3.5.2 Tread design. Safety-tread designs, other than those indicated on figures, may be furnished in lieu of those shown, provided the strength or utility of the cover is not impaired, and the designs are acceptable to the purchaser (see 6.2).

3.5.3 Lifting holes. When specified (see 6.2), special lifting holes, other than those indicated on the figures, shall be provided either at the edge of the cover or in the body of the cover.

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3.5.4 Ventilating holes. When specified (see 6.2), ventilating holes, other than those shown in figure 10, shall be furnished.

3.5.5 Identification marking. When specified (see 6.2), identification symbols (WATER, SEWER, AND ELECTRIC) shall be provided in the center of the cover.

3.5.6 Accessory items. When the inner cover shown in figure 17 is specified, a rubber gasket for making water-tight joints shall be furnished (see 6.2). The gasket shall conform to the type recommended by the manufacturer of the manhole frames and covers.

3.5.7 Alternate designs. Frames may be furnished with designs other than those indicated on the figures provided that such designs meet the load bearing requirements and do not adversely affect cover interchangeability and have the same opening area and masonry contact area as specified.

3.6 Gratings. Gratings shall be of the general configurations shown in figures 13 through 16. Unless otherwise specified (see 6.2), gratings shall be cast iron conforming to 3.2.1.

3.7 Locking bars. Locking bars shall be the manufacturer's standard for use with type II frames and inner covers. General configuration shall be as depicted in figure 18. When specified (see 4.5.3 and 6.2), locking bars shall show no evidence of fracture or flaws when tested in accordance with 4.5.3. Unless otherwise specified (see 6.2), locking bars shall be cast steel conforming to 3.2.2.

3.7.1 Locking-bar bolt. Locking-bar bolts shall be 5-3/4 inches long, 3/4 inch in diameter, and shall have a commercial hex head. Bolts shall be made in copper alloy, naval brass, or bronze, and shall be threaded in accordance with FED-STD-H28 thread designation 8 UNC-2A.

3.8 Steps.

3.8.1 Conventional manhole steps. Unless otherwise specified (see 6.2), conventional manhole steps shall be cast iron conforming to 3.3.1 and of the manufacturer's standard design, similar to the configuration of figure 19. Conventional manhole steps shall be of the width and depth specified (see 6.2).

3.8.2 Nonsparking steps. When nonsparking steps are required (see 6.2), they shall be the manufacturer's standard design in a nonsparking material.

3.9 Dimensions. The critical dimensions of the frames, covers, gratings, locking bars, and steps shall conform to the dimensions indicated on the figures contained herein and be within the tolerance limits specified herein. Critical dimensions are defined as those which affect the load bearing capacity, cover interchangeability, opening area, or masonry contact area of the unit.

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3.10 Tolerances. Unless otherwise specified (see 6.2), the dimensions of all castings shall have a tolerance of $\pm 1/16$ inch, and an additional tolerance of $\pm 1/16$ inch per foot of dimension. Notwithstanding the above

shall be machined to the degree that a cover or grate placed in a matched frame shall seat without rocking.

3.10.2 Square frames, covers, and grates. The surfaces of square frames, covers, and grates shall be so machined that covers or grates placed in matched frames shall seat without rocking. Unless otherwise specified (see 6.2), the manufacturer's tolerance on square corners will be acceptable.

3.10.3 Levelness. The frame, cover, or grate difference in level between the cover or grating and the frame shall not exceed $1/8$ inch at any point, and shall not exceed $1/16$ inch over a total of more than one-quarter of the frame perimeter.

3.10.4 Side play. When the cover, grating, and frame is furnished as an assembly, the side play between any one of these units shall not exceed $1/8$ inch per foot of diameter clearance on cast vertical surfaces.

3.11 Strength requirements.

3.11.1 Traffic loads. Unless otherwise specified (see 6.2), when tested in accordance with 4.5.1, frames, covers, and gratings shall have a minimum transverse proof-load strength of 25,000 pounds (lb). The test shall cause no cracks or permanent deformations.

3.11.2 Special load requirements. When frames, covers, and gratings are to be used in applications where the proof load of 25,000 lb is insufficient, special load requirements shall be specified by the contracting officer (see 6.2).

3.11.3 Nontraffic loads. Frames, covers, and grating loads for nontraffic applications shall have a minimum transverse proof-load strength of 1,000 lb when tested in accordance with 4.5.1. No cracks or permanent deformation shall develop under test.

3.11.4 Test bars. In lieu of determining the proof-load strength for frames, covers, and gratings, the alternate load test of 4.5.2 shall be used to verify the material properties, when specified (see 4.5.1 and 6.2). The test bars submitted for the alternate load test shall be prepared and tested in accordance with the appropriate material specification.

3.12 Workmanship. Castings shall be free of blowholes, splits, cracks, blisters, mold-pull, and other imperfections that may impair serviceability. A draft angle of 2 to 5 degrees ($^{\circ}$) will be accepted provided it does not interfere with the fit of the assembly.

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3.12.1 Surface finish. The following portions of castings shall be milled.

- a. The horizontal surface of the frame on which the cover and grating sit.
- b. The under surfaces of covers and grates that rest upon the frames.

3.12.2 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 value 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.

3.12.3 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.

3.12.4 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.

3.12.5 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

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 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 ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification

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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 Material inspection. The contractor is responsible for insuring that supplies and materials are inspected for compliance 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 of each classification ordered when a first article is required (see 3.1 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, 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, the tests of 4.5, and the packaging inspection of 4.6. 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 MIL-STD-105. All units offered for delivery at one time shall be considered a lot for purpose of inspection. Sampling for examination. (See 6.1.2).

4.3.1 Sampling for tests. (See 6.5.1)

4.3.2 Sampling for examination. (See 6.1.2)

4.3.3 Lots. A lot shall consist of all manhole frames, covers and gratings, locking bars, or steps of the same type, size, and style offered for delivery at the same time.

4.3.3.1 Test bar lots. A lot shall contain three test bars made from each heat from which castings are selected for the lot, and each bar shall be identifiable with the casting by means of a corresponding date or heat number cast or stamped in both castings and bars. The bars shall be heat treated with and in the same manner as the frames, covers, and gratings.

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4.3.4.1 Sampling for alternate load test. When specified (see 6.2), one test bar shall be selected from the lot and tested in accordance with 4.5.2.

4.4 Examination. Each item selected shall be examined for compliance with the requirements of section 3. This element of inspection shall encompass all visual examinations and dimensional measurements, with particular emphasis on tolerances, fits, and interchangeability of like parts. Noncompliance with any specified requirement shall constitute a defect.

4.5 Tests. Tests shall be conducted as specified herein. Specification of test requirements does not preclude the use of other test fixtures if the mechanics of the systems are duplicated for similar tests. Any failure of welds or mechanical joints or any permanent distortions in excess of that specified or any other damage to any part of the item that would affect serviceability will be considered as failing to comply with the requirements of this specification. Certified evidence of compliance with all applicable tests must be available for inspection upon request. Items used in the test must be available for examination by the inspector.

4.5.1 Proof-load test. For first article inspection, or when specified for quality conformance inspection (see 6.2), the frames and covers or gratings selected in accordance with 4.3.3 shall show no permanent deformation when the proof load, specified in 3.7, is concentrated on a 9 - by 9 - inch area placed on the cover or grate (see figure 20). The specified load shall be applied by a suitable testing machine and held for a period of one minute. Upon removal of the load, the cover or grating and frame shall be examined for cracks, or permanent deformation, such as buckling. Any cracks or permanent deformation shall be cause for rejection.

4.5.2 Alternate load test. When specified, for quality conformance inspection (see 3.7.4 and 6.2), test bars selected in accordance with 4.3.3.1 shall be subjected to tensile testing. Test bar preparation and tensile testing shall be in accordance with the applicable material specification. Failure of the test specimen to meet the minimum mechanical properties specified shall be cause for rejection.

4.5.3 Magnetic particle test. For first article inspection or when specified for quality conformance inspection (see 3.7 and 6.2), locking bars selected in accordance with 4.3.3 shall be tested for cracks and flaws by the magnetic particle examination as specified in ASTM E 709.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or commercial as specified (see 6.2).

5.1.1 Level A. Frames, covers, gratings, bars, and steps shall be packaged to provide physical and mechanical protection. Shipping containers

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and configurations of 5.2 may be used as the unit container. Package quantities shall be within the weight limitation of the container or unit load specification.

5.1.2 Commercial. The equipment shall be preserved in accordance with the contractor's standard practice in a manner to prevent deterioration and damage.

5.2 Packing. Packing shall be level A, B, or commercial as specified (see 6.2).

5.2.1 Levels A and B. Packing shall be in accordance with applicable requirements of MIL-STD-2073-1. Containers shall be selected from table VII of MIL-STD-2073-1.

5.2.2 Commercial. Item shall be packaged in accordance with ASTM D 3951.

5.3 Marking. Marking shall be as specified (see 6.2).

5.3.1 Military agencies. Shipments to military agencies shall be marked in accordance with the requirements of MIL-STD-2073-1 or ASTM D 3951.

5.3.2 Civil agencies. Shipments to civil agencies shall be marked in accordance with FED-STD-123.

6. NOTES

6.1 Intended use. Manhole frames, covers, gratings, and steps covered by this specification are intended for use in the construction of manholes for drainage, sanitation, and other underground utility applications.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type, style, and size (and applicable options) of frame, cover, grating, or step required (see 1.2.1 and figures 1 through 17 and figure 19).
- c. Issue of DODISS to be cited in the solicitation, and if required, specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. When a first article is required for inspection and approval (see 3.1, 4.2.1, and 6.4).
- e. When material for frames, covers, grating, or conventional manhole steps shall be other than cast iron (see 3.4, 3.5, 3.6, and 3.8.1.)
- f. Whether different style of cover and tread design are required (see 3.5.2).
- g. Whether lifting holes and ventilating holes unlike those indicated are required (see 3.5.3, 3.5.4, and figure 10).

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- h. Type of identification marking required (see 3.5.5).
- i. Whether accessory items are required, and type of gasket required (see 3.5.6 and figure 12).
- j. When quality conformance testing of locking bars shall be required (see 3.7 and 4.5.3).
- k. When material for locking bars shall be other than cast steel (see 3.7).
- l. When conventional manhole steps shall be other than cast iron; and what the width and depth of the conventional manhole steps shall be (see 3.8.1 and figure 19).
- m. When nonsparking manhole steps are required (see 3.8.2).
- n. Whether tolerance unlike those specified is required (see 3.10 and 3.10.2).
- o. Strength requirements, if different (see 3.11.1 and 3.11.2).
- p. Whether test bars for alternate load tests are required (see 3.11.4, 4.3.4.1, and 4.5.2).
- q. Whether 4.5.1 or 4.5.2 or neither shall be required for quality conformance test (see 4.5.1 and 4.5.2).
- r. Level of preservation and packaging and level of packing required (see 5.1 and 5.2).
- s. Marking required (see 5.3).
- t. Frame heights required (see figures 1 and 5).
- u. Flange widths required (see figures 2 and 3).
- v. Height of type II frame if different than 11 inches (see figure 2).

6.3 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DOD FAR Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data shall be delivered by the contractor in accordance with the contract or purchase order requirements.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of (one), (two), etc unit(s). The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.5 Sampling procedures.

6.5.1 Sampling for tests. Recommended inspection level is S-2 and acceptable quality level (AQL) is 1.5 percent defective. (See 4.3.1)

6.5.2 Sampling for examination. Recommended inspection level S-4 and an (AQL) of 1.5 percent defective. (See 4.3.2)

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MILITARY INTERESTS:

Custodians

Navy - YD
Air Force - 99

User Activities

Army - CE
Navy - MC

Review Activity

Air Force - 84

CIVIL AGENCY COORDINATING ACTIVITY:

GSA - FSS

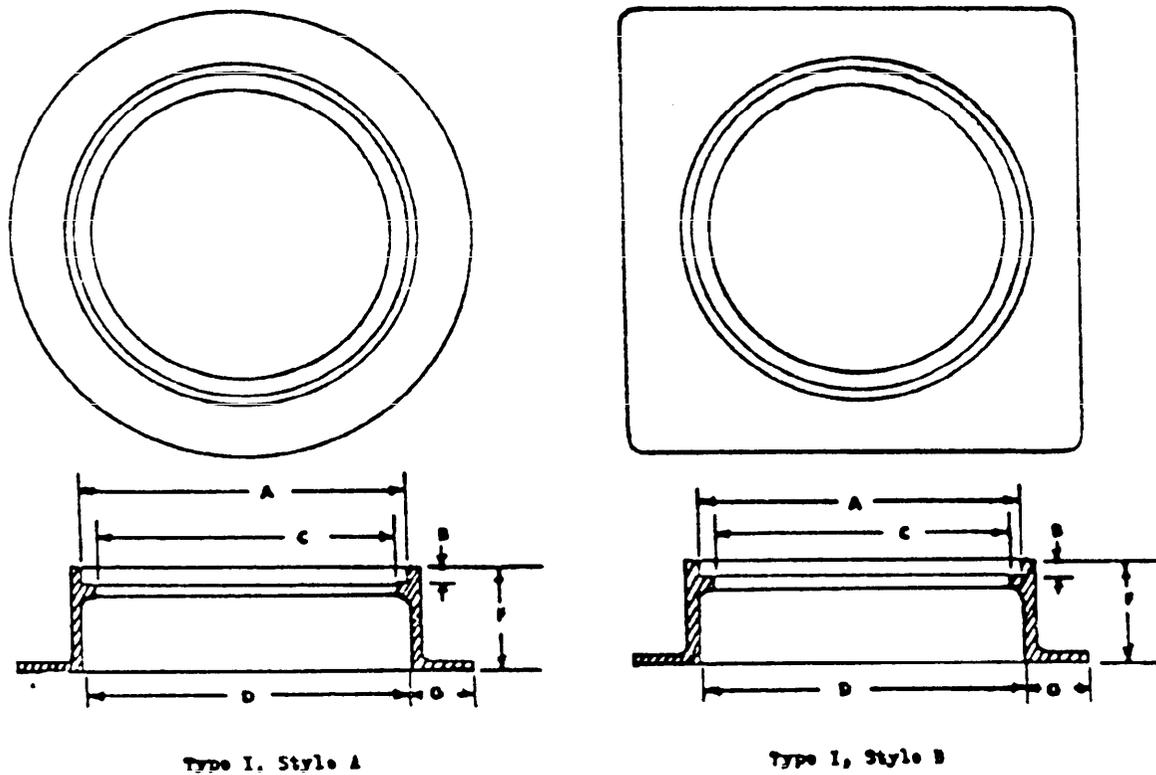
PREPARING ACTIVITY:

Navy - YD

(Project No. 5680 0164)

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.

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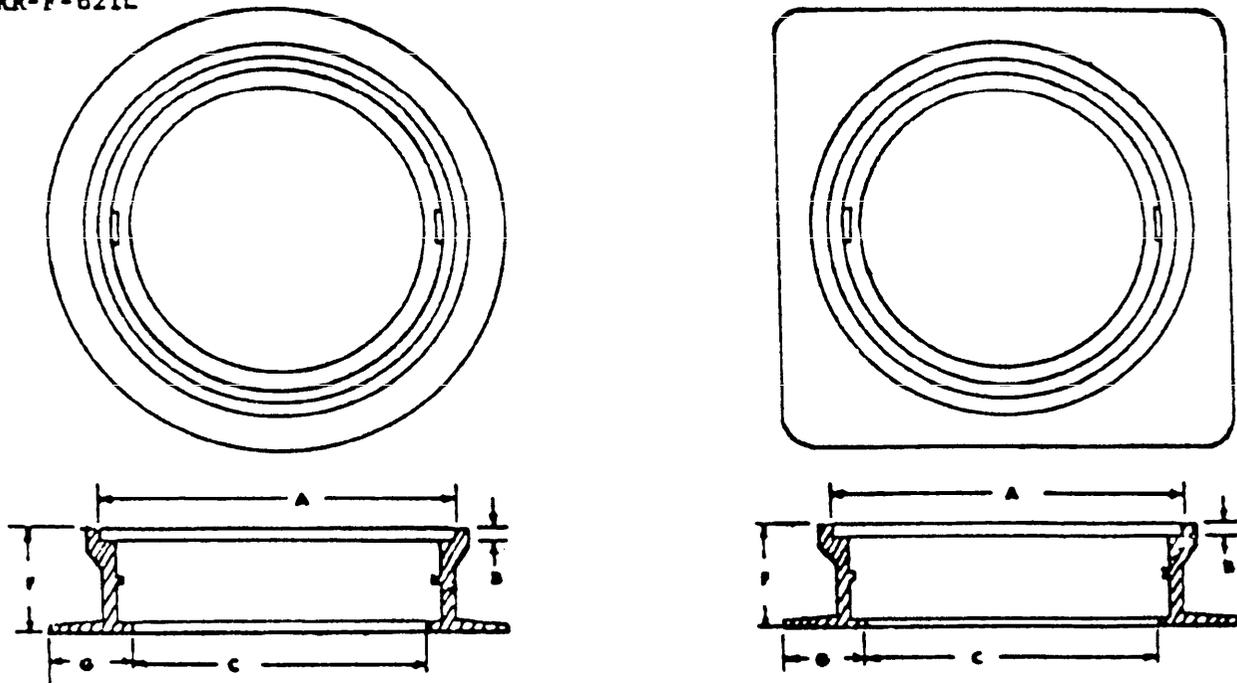
Dimensions for type I frame, style A and style B

Style	Size	A	B	C	D	F	G
A	22A	24	1-3/8	22	24-1/2	6, 7, or 8	4
	22B	24	1-1/2	22	24-1/2	6, 7, or 8	4
	22C	24	2	22	24-1/2	6, 7, or 8	4
A	24A	26	1-3/8	24	26-1/2	6, 7, or 8	4
	24B	26	1-1/2	24	26-1/2	6, 7, or 8	4
	24C	26	2	24	26-1/2	6, 7, or 8	4
A	27A	29	1-3/8	27	29-1/2	6, 7, or 8	4
	27B	29	1-1/2	27	29-1/2	6, 7, or 8	4
	27C	29	2	27	29-1/2	6, 7, or 8	4
A	30A	32	1-3/8	30	32-1/2	6, 7, or 8	4
	30B	32	1-1/2	30	32-1/2	6, 7, or 8	4
	30C	32	2	30	32-1/2	6, 7, or 8	4
B	36A	38	1-3/8	36	39-1/2	6, 7, or 8	4
	36B	38	1-1/2	36	39-1/2	6, 7, or 8	4
	36C	38	2	35	39-1/2	6, 7, or 8	4
C	42A	44	1-3/8	42	45-1/32	6, 7, or 8	4
	42B	44	1-1/2	42	45-1/32	6, 7, or 8	4
	42C	44	2	42	45-1/32	6, 7, or 8	4

- NOTE: 1. All values are in inches.
 2. For appropriate covers see Figures 8, 9, 10, 11, and 13.
 3. Size of the frame refers to the actual clear opening.
 4. Dimensions for height "F" shall be one of the options listed, as specified (see 6.2).

Figure 1. Type I, straight traffic frame, style A and style B.

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Type II, style A frame

Type II, style B frame

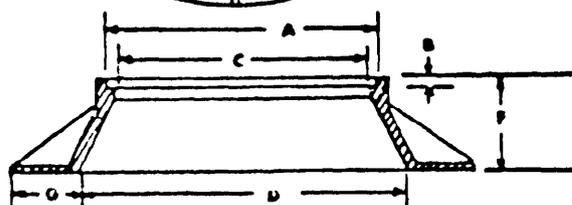
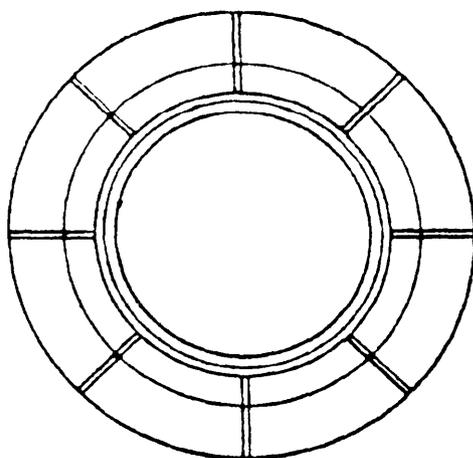
Dimensions for type II frame, style A and style B

Style	Size	A	B	C	F	G
A	24A	31-3/4	1-3/8	24	11	6 or 8
	24b	31-3/4	1-1/2	24	11	6 or 8
or	27A	33-1/2	1-3/8	27	11	6 or 8
	27b	33-1/2	1-1/2	27	11	6 or 8
B	30A	36-1/2	1-3/8	30	11	6 or 8
	30b	36-1/2	1-1/2	30	11	6 or 8

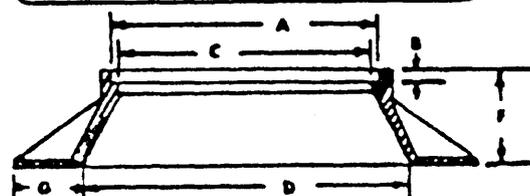
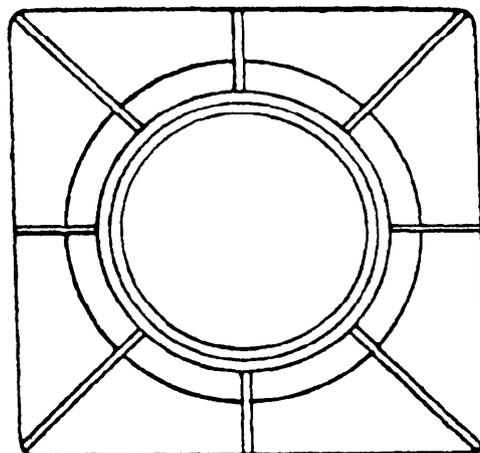
- NOTE: 1. All values are in inches.
 2. Size refers to actual clear-opening.
 3. Dimensions for flanges "C" shall be one of the options listed as specified (see 6.2).
 4. When specified, the height of the frame "F" may be 8 inches (see 6.2).
 5. Covers: For appropriate outer cover see Figure 8.
 For inner cover and locking bar see Figures 17 and 18.

Figure 2. Type II, straight traffic frame for inner cover, style A and B.

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Type III, style A



Type III, style B

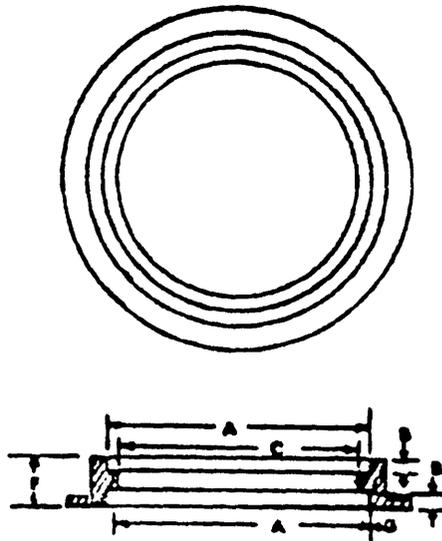
Dimensions for type III frame, style A and style B

Size	A	B	C	D	F	G
24A	26	1-3/8	24	35	10	4, 5, or 6
24B	26	1-1/2	24	35	10	4, 5, or 6
24C	26	2	24	35	10	4, 5, or 6
27A	29	1-3/8	27	38	10	4, 5, or 6
27B	29	1-1/2	27	38	10	4, 5, or 6
27C	29	2	27	38	10	4, 5, or 6
30A	32	1-3/8	30	41	10	4, 5, or 6
30B	32	1-1/2	30	41	10	4, 5, or 6
30C	32	2	30	41	10	4, 5, or 6
36A	38	1-3/8	36	47	10	4, 5, or 6
36B	38	1-3/8	36	47	10	4, 5, or 6
36C	38	2	36	47	10	4, 5, or 6
42A	44	1-3/8	42	53	10	4, 5, or 6
42B	44	1-1/2	42	53	10	4, 5, or 6
42C	44	2	42	53	10	4, 5, or 6

- NOTE: 1. All values are in inches.
 2. Dimensions for flanges "G" shall be one of the options listed as specified (see 6.2).
 3. Covers: For appropriate covers see Figures 8, 9, 10, and 11.

Figure 5. Type III, flanged traffic frame, style A and style B.

KX-7-621E

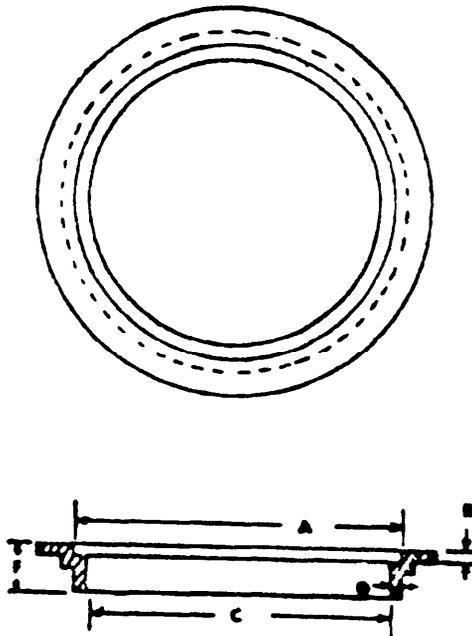


Dimensions for type IV, non-traffic frame

Size	A	B	C	F	G	H
10	12-1/2	1	10-1/2	3	2	7/16
12	14-1/2	1	12-1/2	3	2	7/16
14	16-1/2	1	14-1/2	3	2	7/16
16	18-1/2	1	16-1/2	3	2	7/16
18	20-1/2	1	18-1/2	3	2	7/16
22	24-1/2	1	22-1/2	3	2	7/16
25	27-1/2	1	25-1/2	3	2	7/16
28	30-1/2	1	28-1/2	3	2	7/16
30	32-1/2	1	30-1/2	3	2	7/16

- NOTE: 1. All values in inches.
 2. This frame can be used either side up and the appropriate cover will fit. Side to be up must be specified (see 6.2), to assure machining of proper surface.
 3. Covers: For appropriate covers and grates see Figures 12 and 15.
 4. Size of frame refers to the actual clear opening.

Figure 4. Type IV, non-traffic frame



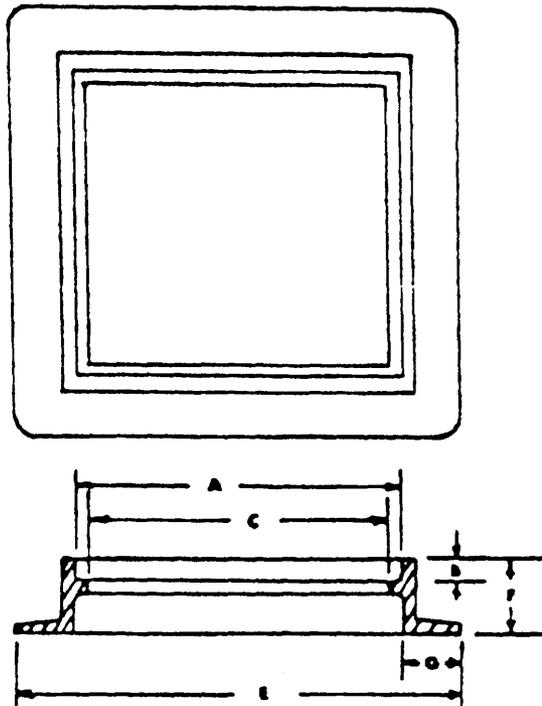
Dimensions for type V, ring type frame

Size	A	B	C	F	G
18	21-1/2	2-1/2	18	4, 6, or 8	1
22A	24	1-3/8	22	4, 6, or 8	1
22B	24	1-1/2	22	4, 6, or 8	1
22C	24	2	22	4, 6, or 8	1
24A	26	1-3/8	24	4, 6, or 8	1
24B	26	1-1/2	24	4, 6, or 8	1
24C	26	2	24	4, 6, or 8	1
24D	26	2-1/2	24	4, 6, or 8	1
30A	32-3/8	2	30	4, 6, or 8	1
30B	32	2	30	4, 6, or 8	1
36A	38	2	36	4, 6, or 8	1
36B	38	2	36	4, 6, or 8	1

- NOTE:
1. All values are in inches.
 2. Covers: For appropriate covers see Figures 8, 9, 10, 11, and 13.
 3. Size of frame refers to the actual clear opening.
 4. Dimensions for height "F" shall be one of the options listed as specified (see b.2).

Figure 5. Type V, ring type frame

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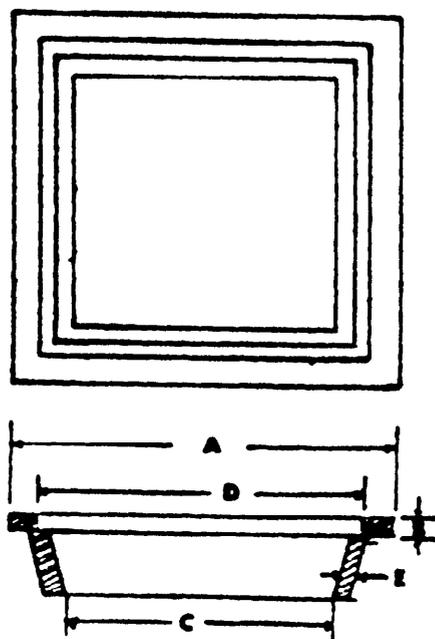
Dimensions for type VI, catch basin frame

Size	A	B	C	E	F	G
22A	24	1-3/8	22	32-1/2	7	4
22B	24	2	22	32-1/2	7	4

- NOTE: 1. All values are in inches.
 2. Covers: For appropriate covers See Figure 14.
 3. Size of frame refers to the actual clear opening.

Figure 6. Type VI, catch basin frame, traffic

BK-F-621E



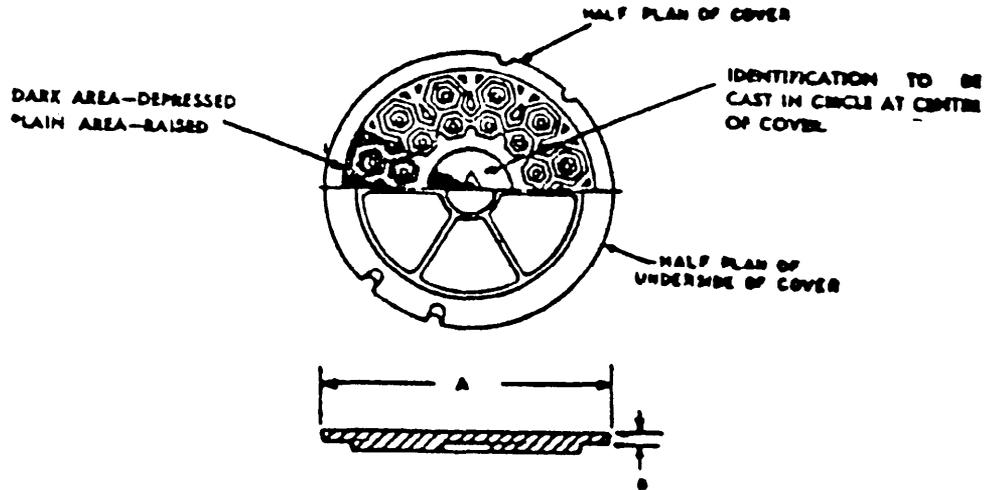
Dimensions for type VII, sump frame.

Size	A	B	C	D	E
12	15	1/2	12	13	3/8

- NOTE: 1. All values are in inches.
 2. Covers: For appropriate covers see Figure 16.
 3. Size of frame refers to the actual clear opening.

Figure 7. Type VII, Sump frame

RR-F-621E



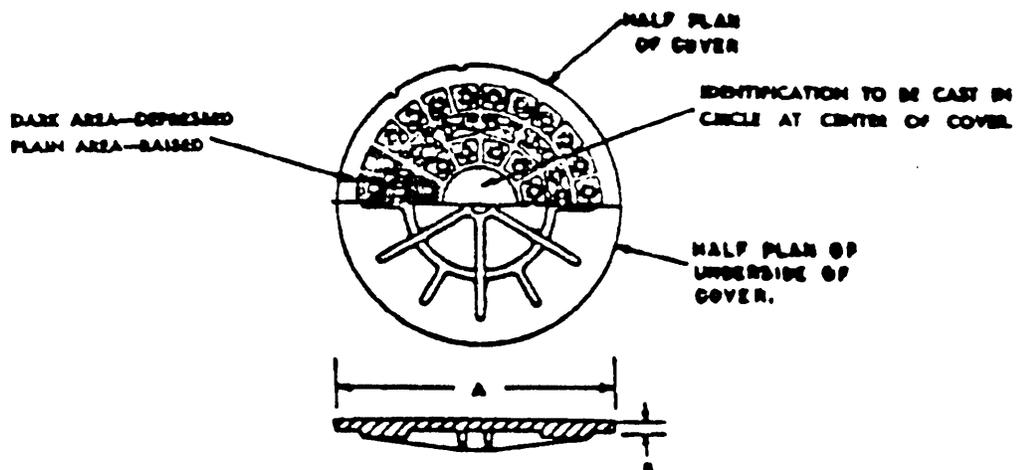
Dimensions for type A, manhole cover, traffic

Style	Size	A	B
Straight, nonlocking frame, flared frame, or ring frame	22A	23-15/16	1-3/8
	22B	23-15/16	1-1/2
	22C	23-15/16	2
	24A	25-15/16	1-3/8
	24B	25-15/16	1-1/2
	24C	25-15/16	2
	27A	28-15/16	1-3/8
	27B	28-15/16	1-1/2
	27C	28-15/16	2
	30A	31-15/16	1-3/8
	30B	31-15/16	1-1/2
	30C	31-15/16	2
Straight locking frame	24A	31-11/16	1-3/8
	24B	31-11/16	1-1/2
	27A	33-7/16	1-3/8
	27B	33-7/16	1-1/2
	30A	36-7/16	1-3/8
	30B	36-7/16	1-1/2

- NOTE: 1. All values are in inches.
2. Frames: For appropriate frames see Figures 1, 2, 3, and 5.
3. Size of frame refers to the actual clear opening.

Figure 8. Type A, manhole cover, traffic

RR-F-621E



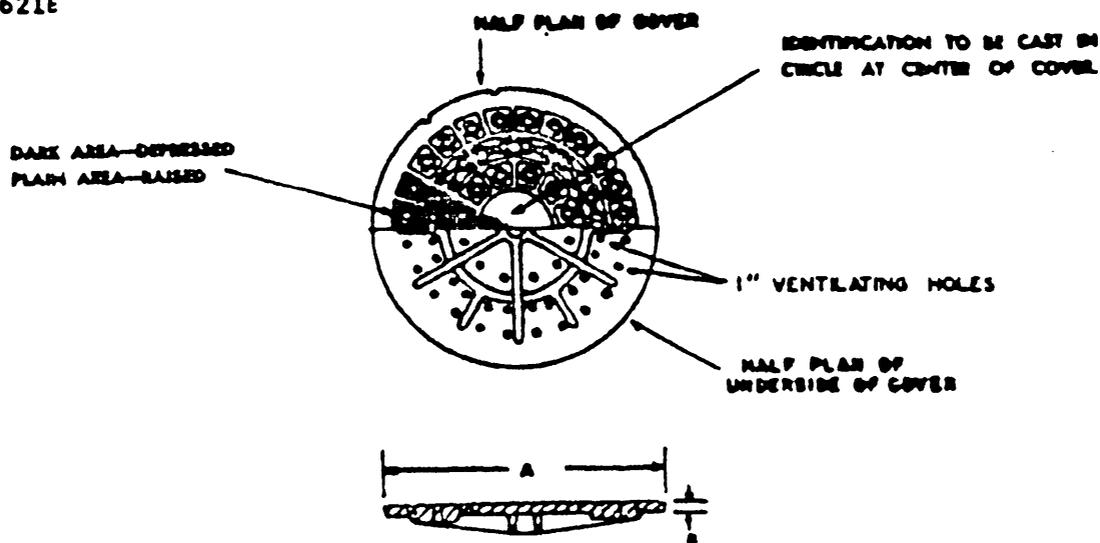
Dimensions for type B cover.

Size	A	B
36A	37-7/8	1-3/8
36B	37-7/8	1-1/2
36C	37-7/8	2
42A	43-7/8	1-3/8
42B	43-7/8	1-1/2
42C	43-7/8	2

- NOTE: 1. All values are in inches.
 2. Frames: For appropriate frames see Figures 1, 3, and 5.
 3. Size of frame refers to the actual clear opening.

Figure 9. Type B, manhole cover, traffic

RR-P-621E



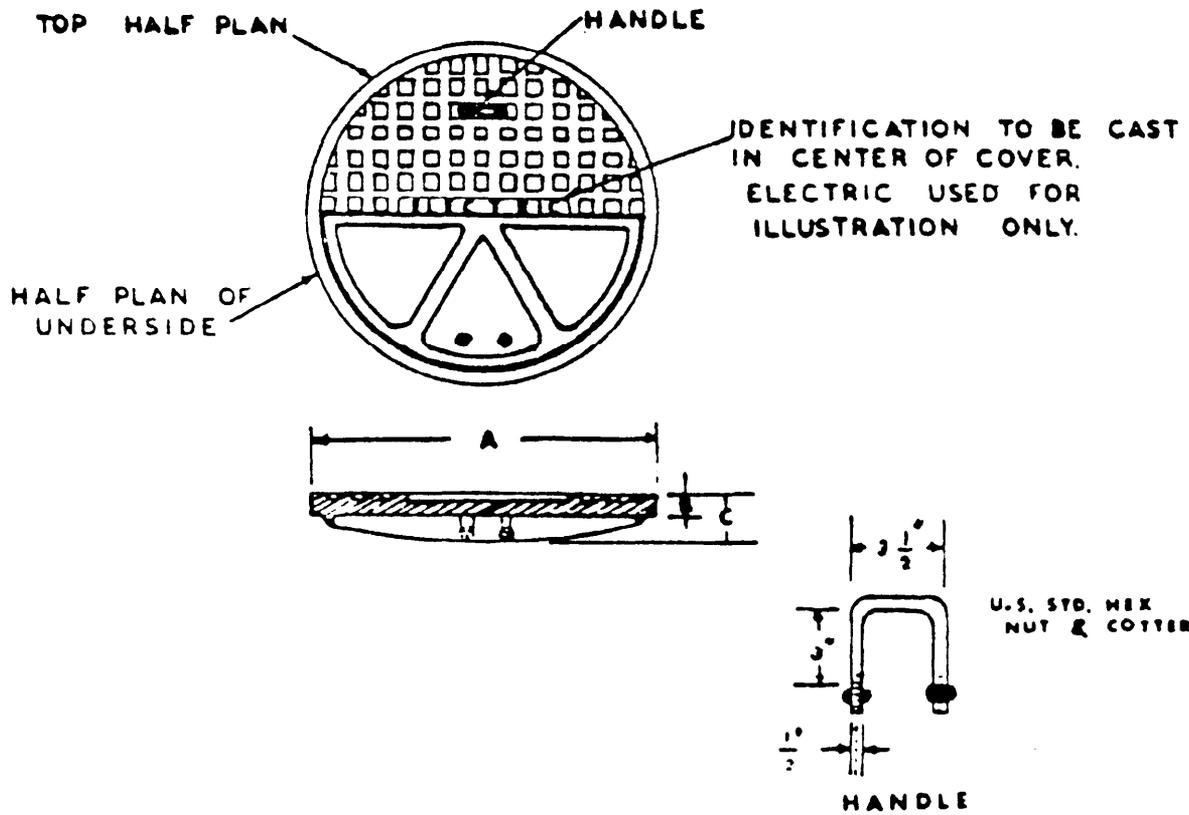
Dimensions for type C cover

Size	A	B
27A	26-15/16	1-3/8
27B	26-15/16	2
30A	31-15/16	1-3/8
30B	31-15/16	2

- NOTE: 1. All values are in inches.
 2. For appropriate frames, see Figures 1, 3, and 5.
 3. Size of the cover refers to frame clear opening.

Figure 10. Type C, manhole cover, with vent holes, traffic.

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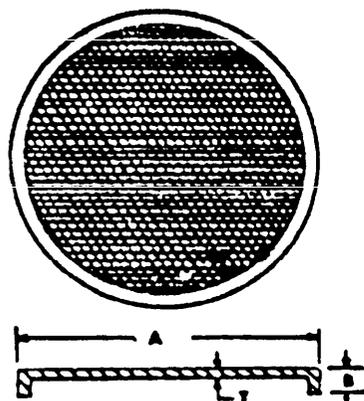
Dimensions for type D cover.

Size	A	B	C
30A	31-7/8	1-3/8	2-5/8
30B	31-7/8	2	3-1/4

- NOTE:
1. All values are in inches.
 2. For appropriate frames, see Figures 1 and 3.
 3. Size of cover refers to frame clear opening.

Figure 11. Type D, manhole cover, traffic.

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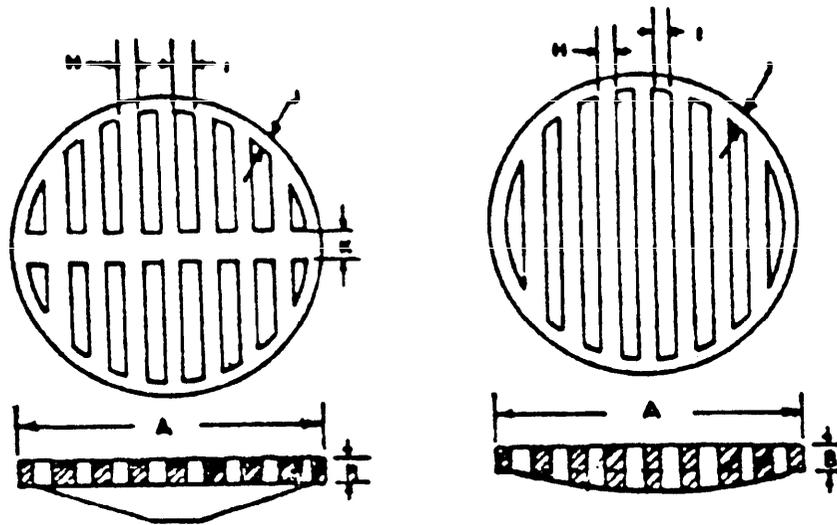
Dimensions for type E covers.

Size	A	B	T
10	12	1	1/2
12	14	1	1/2
14	16	1	1/2
16	18	1	1/2
18	20	1	1/2
22	24	1	1/2
25	27	1	1/2
28	30	1	1/2
30	32	1	1/2

NOTE: 1. All values are in inches.
 2. Frames: For appropriate frames see Figure 4.
 3. Size of cover refers to frame clear opening.

Figure 12. Type E manhole cover, nontraffic.

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Type F, Style 1.

Type F, Style 2.

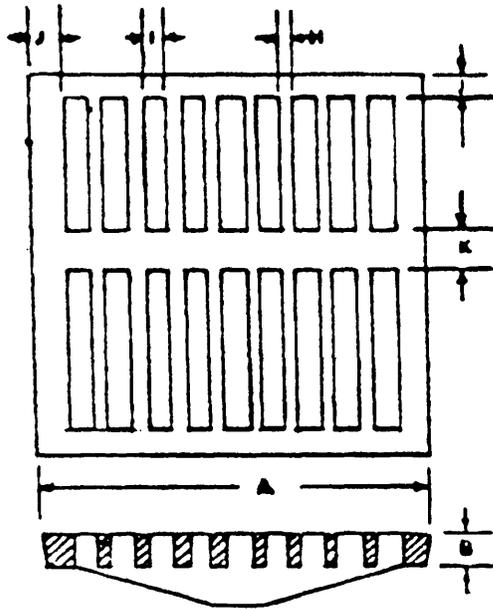
Dimensions for type F, manhole grating.

Size	A	B	H	I	J	K
18A	21-7/16	2-1/2	1	1-1/2	1-1/2	2-1/2
22A	23-15/16	1-3/8	1	1-1/2	1-1/2	2-1/2
22B	23-15/16	2	1	1-1/2	1-1/2	2-1/2
22C	23-15/16	2-1/2	1	1-1/2	1-1/2	2-1/2
24A	25-15/16	1-3/8	1	1-1/2	1-1/2	2-1/2
24B	25-15/16	2	1	1-1/2	1-1/2	2-1/2
24C	25-15/16	2-1/2	1	1-1/2	1-1/2	2-1/2

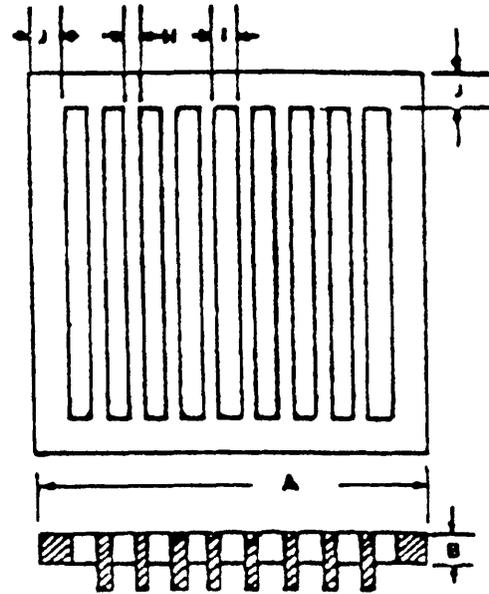
- NOTE: 1. All values are in inches.
 2. Frames: For appropriate frames see Figures 1, 3, and 5.
 3. Size of grating refers to frame clear opening.

Figure 13. Type F, manhole grating, traffic.

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Type O, Style 1.



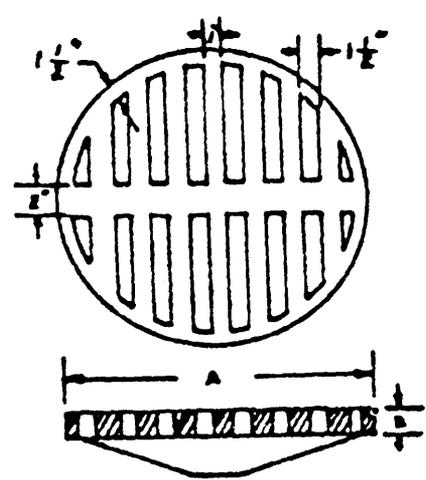
Type O, Style 2.

Dimensions for type O catch basin grating.

Size	A	B	H	I	J	K	Open pass area	
							Style 1	Style 2
22A	23-15/16	1-3/8	1	1-7/16	1-1/2	2	246	271
22B	23-15/16	2	1	1-7/16	1-1/2	2	246	271

- NOTE: 1. All values are in inches.
 2. Frames: For appropriate frame see Figure 6.
 3. Size of grating refers to frame clear opening.

Figure 14. Type O, catch basin grating.



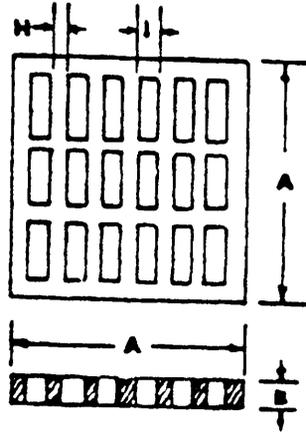
Dimensions for type H manhole grating.

Size	A	B
10	12	1
12	14	1
14	16	1
16	18	1
18	20	1
22	24	1
25	27	1
28	30	1
30	32	1

- NOTE:
1. All values are in inches.
 2. Frames: For appropriate frame see Figure 4.
 3. Size of grating refers to frame clear opening.

Figure 15. Type H, manhole grating, nontraffic.

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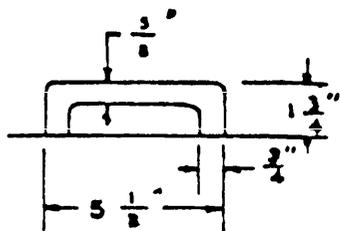
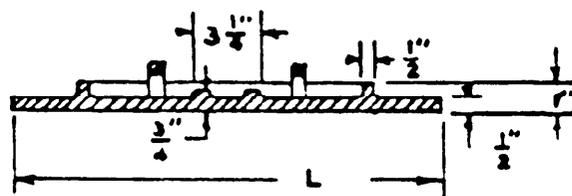
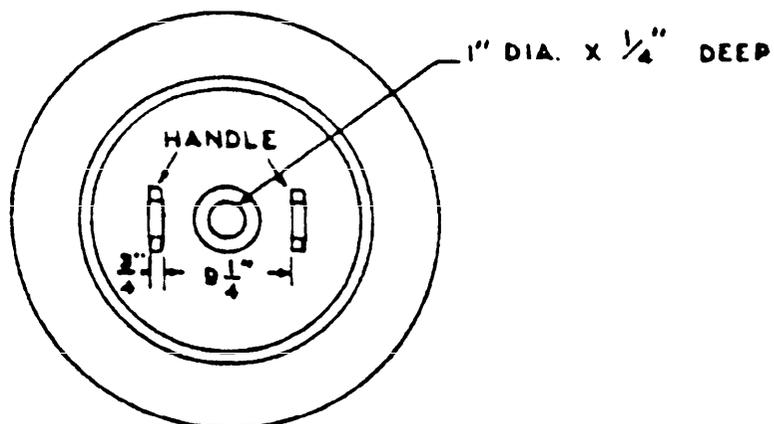


Dimensions for type I sump grating.

Size	A	B	H	I
12	13	1/2	1	1

- NOTE:
1. All values are in inches.
 2. Frame: For appropriate frame see Figure 7.
 3. Size of grating refers to frame clear opening.

Figure 16. Type I sump grating.



SIDE VIEW OF HANDLE

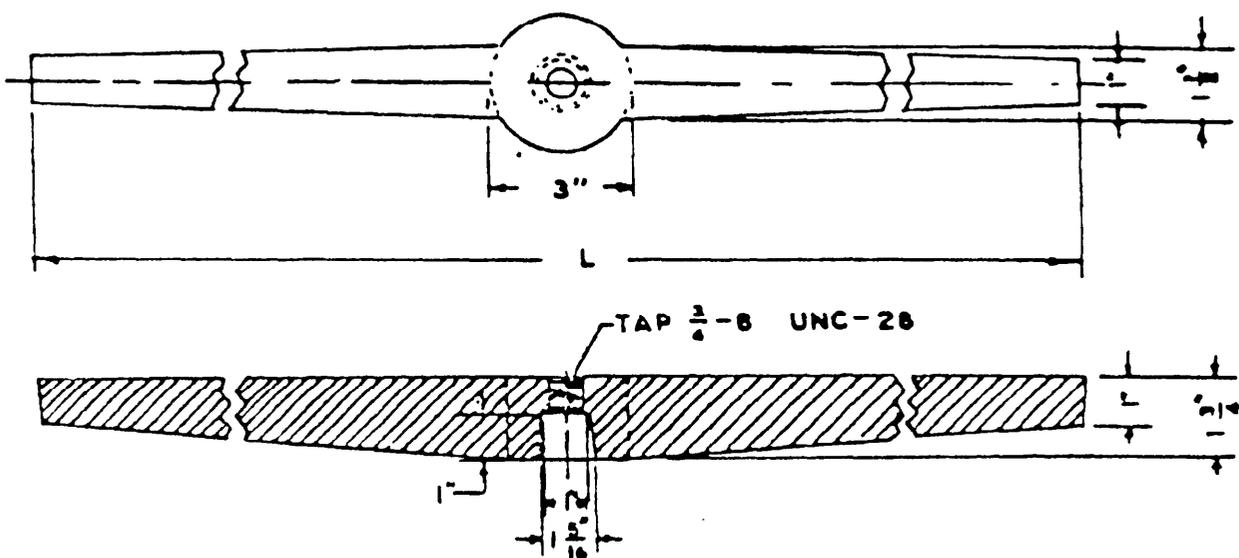
Dimensions for inner covers for locking type frames.

Size	L
24	26-1/4
27	29-1/4
30	32-1/4

- NOTE:
1. All values are in inches
 2. For proper frame see Figure 2.
 3. Size of cover refers to frame clear opening.

Figure 17. Inner manhole cover.

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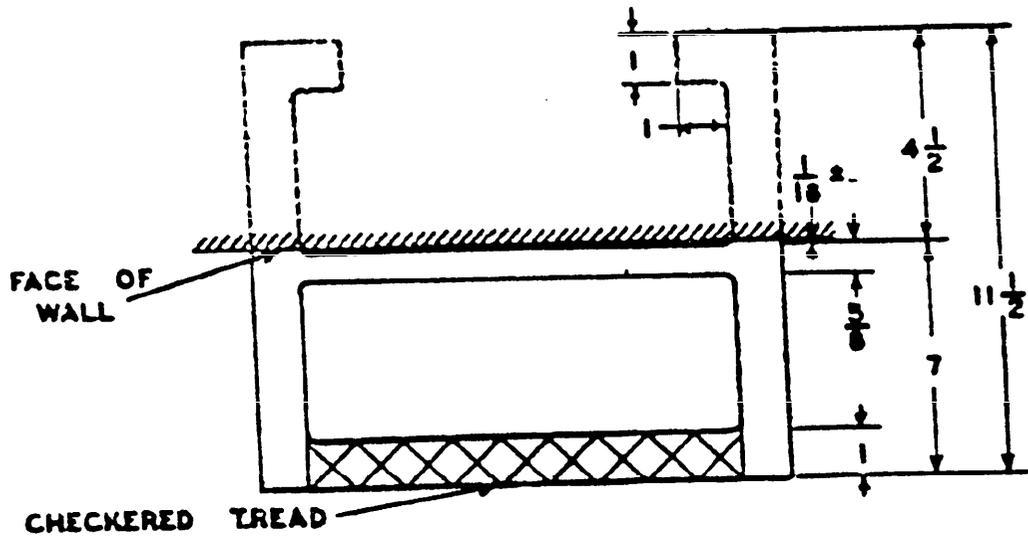
Dimensions for locking bar.

Size	L
24	28
27	31
30	34

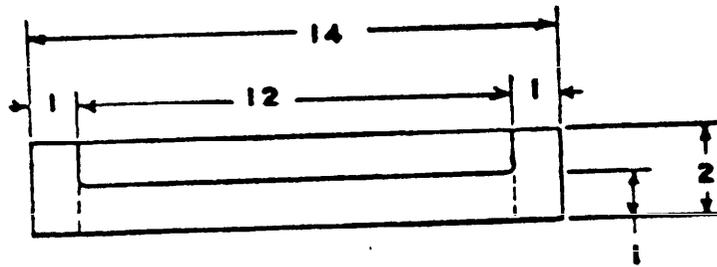
NOTE: 1. All values are in inches.

Figure 18. Locking bar.

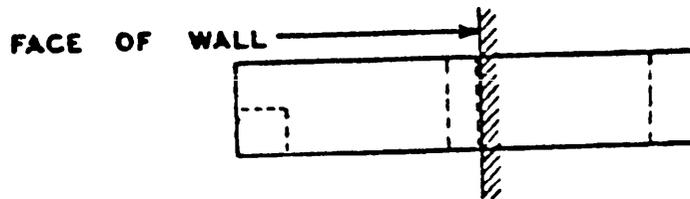
RR-P-621E



PLAN



FRONT ELEVATION



SIDE ELEVATION

Figure 19. Standard manhole step.

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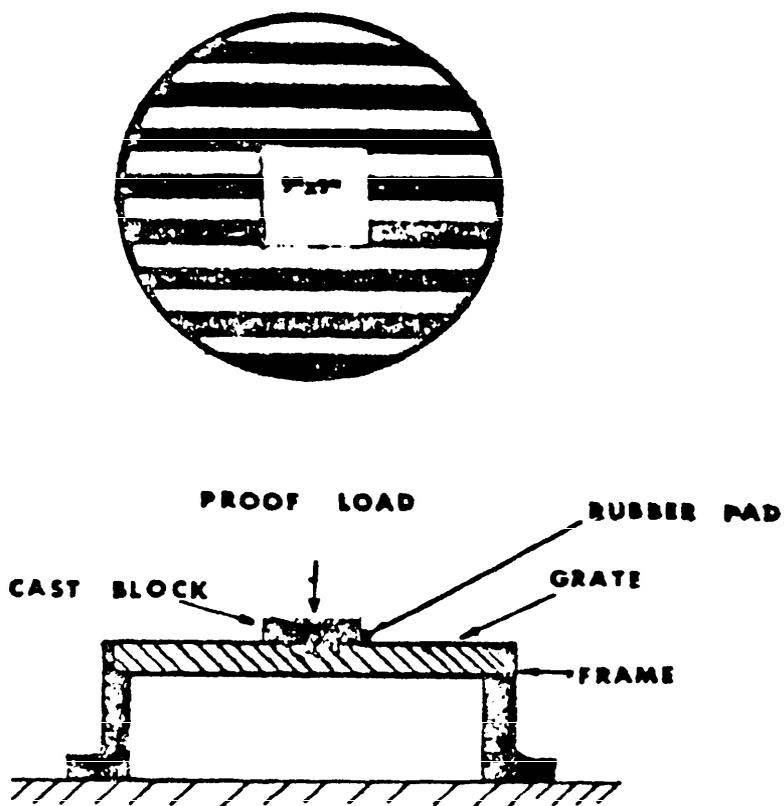


Figure 20. Diagram for proof load position.
(For illustrative purposes only.)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

RR-F-621E

2. DOCUMENT TITLE

FEDERAL SPECIFICATION - FRAMES, COVERS,
GRATINGS, STEPS, SUMP AND CATCH BASIN, MANHOLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

 VENDOR USER MANUFACTURER OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

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8. DATE OF SUBMISSION (YYMMDD)

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