



Standard Specification for Ductile Iron Gravity Sewer Pipe¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers 4 to 64-in. ductile iron gravity sewer pipe centrifugally cast with push-on joints. This specification may be used for pipe with other types of joints, as may be agreed upon at the time of purchase.

1.2 This specification covers trench load design procedures for both cement-lined pipe and flexible-lined pipe. Maximum depth of cover tables are included for both types of linings.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 ASTM Standards:²

D 2847 Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D 3282 Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

E 8 Test Methods for Tension Testing of Metallic Materials

E 23 Test Methods for Notched Bar Impact Testing of Metallic Materials

2.2 ANSI/AWWA Standards:

C104/A21.4 Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water³

C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings³

C150/A21.50 Thickness Design of Ductile-Iron Pipe³

C600 Installation of Ductile-Iron Water Mains and Their Appurtenances

2.3 ASCE Standards:

Manuals and Reports on Engineering Practice, No. 37, (WCPF Manual of Practice No. 9). "Design and

Construction of Sanitary and Storm Sewers"⁴

2.4 AASHTO Standard:

AASHTO T-99 Standard Method of Test for the Moisture-Density Relations of Soils Using a 5.5 lb (2.5 kg) Rammer and a 12 in. (305 mm) Drop

3. Terminology

3.1 Symbols: Symbols:

3.1.1 *A*—outside radius of pipe,

$$ft = \frac{D}{24}$$

$$\left(\text{in metres} = \frac{D}{2000} \right)$$

3.1.2 *a*—conversion factor, lb/ft² to psi = 144 (kN/m² to kPa = 1)

3.1.3 *B*—1.5 ft (0.457 m)

3.1.4 *b*—Effective pipe length: 36 in. (0.914 m)

3.1.5 *C*—surface load factor, Table 1

3.1.6 *D*—outside diameter, in., Table 2

3.1.7 *E*—modulus of elasticity, 24 × 10⁶ psi (165.5 × 10⁶ kPa)

3.1.8 *E'*—modulus of soil reaction, psi, Table 3

3.1.9 *F*—impact factor, 1.5

3.1.10 *f*—design bending stress, 48 000 psi (331 × 10³ kPa)

3.1.11 *H*—depth of cover, ft (m)

3.1.12 *K_b*—bending moment coefficient, Table 3

3.1.13 *K_x*—deflection coefficient, Table 3

3.1.14 *P*—wheel load, 16 000 lb (7257 kg)

3.1.15 *P_e*—earth load, psi (kPa)

3.1.16 *P_t*—truck load, psi (kPa)

3.1.17 *P_v*—trench load, psi (kPa) = *P_e* + *P_t*

3.1.18 *R*—reduction factor which takes into account the fact that the part of the pipe directly below the wheels is aided in carrying the truck load by adjacent parts of the pipe that receive little or no load from the wheels, Table 4

3.1.19 *t*—net thickness, in. (mm)

3.1.20 *t₁*—minimum manufacturing thickness, in., *t* + 0.08, (in mm, *t* + 2.0)

¹ This specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.12 on Pipes and Tubes.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036.

⁴ Available from the American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191.