



Designation: ~~C118M-05a~~ Designation: C118M – 11

Standard Specification for Concrete Pipe for Irrigation or Drainage (Metric)¹

This standard is issued under the fixed designation C118M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This specification covers nonreinforced concrete pipe to be used for the conveyance of irrigation water with working pressures, including hydraulic transients, as shown in Table 1 and for use in drainage.

1.2 This specification is the SI counterpart of Specification C118.

NOTE 1—This specification is for manufacturing and purchase only and does not include requirements for bedding, backfill, installation, or field repairs. The owner is cautioned that he must correlate field conditions with the characteristics of the pipe specified and provide inspection during installation.

2. Referenced Documents

2.1 *ASTM Standards:*²

C33 Specification for Concrete Aggregates

C150 Specification for Portland Cement

C497M Test Methods for Concrete Pipe, Manhole Sections, or Tile [Metric]

C595 Specification for Blended Hydraulic Cements

C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C822 Terminology Relating to Concrete Pipe and Related Products

C989 Specification for Slag Cement for Use in Concrete and Mortars

C1116 Specification for Fiber-Reinforced Concrete and Shotcrete

3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C822.

4. Classification

4.1 Pipe manufactured according to this specification shall be known as “ASTM Standard Concrete Irrigation Pipe,” “ASTM Standard Concrete Drainage Pipe,” or “ASTM Heavy-Duty Concrete Drainage Pipe.”

5. Basis of Acceptance

5.1 The acceptability of the pipe shall be determined by the results of the tests prescribed in this specification, if and when required and by inspection to determine whether the pipe conforms to this specification as to design and freedom from defects.

6. Materials

6.1 *Concrete*—The concrete shall consist of cementitious materials, mineral aggregates, and water.

6.2 *Cementitious Materials:*

6.2.1 *Cement*—Cement shall conform to the requirements for portland cement of Specification C150 or shall be portland blast-furnace slag cement, or slag-modified portland cement, or portland-pozzolan cement conforming to the requirements of Specification C595, except that the pozzolan constituent in the Type IP portland-pozzolan cement shall be fly ash.

6.2.2 *Fly Ash*—Fly ash shall conform to the requirements of Specification C618, Class F or Class C.

6.2.3 *Ground Granulated Blast Furnace Slag (GGBFS)*—GGBFS shall conform to the requirements of Grade 100 or 120 of Specification C989.

6.2.4 *Allowable Combinations of Cementitious Materials*—The combination of cementitious materials used in the concrete shall be one of the following:

¹ This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.01 on Non-Reinforced Concrete Sewer, Drain and Irrigation Pipe.

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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.

TABLE 1 Standard Dimensions, Working Pressure, and Test Requirements for Standard Concrete Irrigation Pipe^A

Internal Designated Diameter, mm	Thickness of Wall, T, mm	Working Pressure, ^B kPa	Minimum Internal Hydrostatic Test Pressure, kPa	Minimum Three-Edge-Bearing Load, kN/linear m
150	22	90	345	19.0
200	25	90	345	19.5
250	29	90	345	20.5
300	32	75	310	22.0
350	35	75	310	23.5
375	38	75	310	24.0
400	38	75	310	25.0
450	44	75	310	26.5
500	50	75	275	27.0
525	54	75	275	27.5
600	57	75	275	29.0

^A For hydrostatic test requirements, refer to 10.5.

^B Higher working pressures are not prohibited up to a maximum of 120 kPa for 150 through 200-mm diameters, 105 kPa for 250 through 300-mm diameters, and 90 kPa for 350 through 600-mm diameters. In these cases, the strength of the pipe shall be increased to give a minimum internal hydrostatic test pressure of at least four times the design working pressure when tested as specified in 10.5.

- 6.2.4.1 Portland cement only,
- 6.2.4.2 Portland blast furnace slag cement only,
- 6.2.4.3 Slag modified portland cement only,
- 6.2.4.4 Portland pozzolan cement only,
- 6.2.4.5 A combination of portland cement and fly ash,
- 6.2.4.6 A combination of portland cement and ground granulated blast-furnace slag, or
- 6.2.4.7 A combination of portland cement, fly ash (not to exceed 25 % of the total cementitious weight) and ground granulated blast furnace slag (not to exceed 25 % of the total cementitious weight).

6.3 *Aggregates*—Aggregates shall conform to Specification C33, except that the requirements for gradation shall not apply.

6.4 *Admixtures and Blends*—Admixtures and blends shall only be used with the approval of the owner. Owner is not prohibited from obtaining the record of mix design used.

6.5 *Synthetic Fibers*—Collated fibrillated virgin polypropylene fibers are not prohibited in concrete pipe as a nonstructural manufacturing material. Only Type III synthetic fibers designed and manufactured specifically for use in concrete and conforming to the requirements of Specification C1116 shall be accepted.

7. Design

7.1 *Design Tables*—Design requirements shall be in accordance with Table 1 for standard concrete irrigation pipe or with the applicable part of Table 2 for concrete drainage pipe. Wall thicknesses used shall be not less than the values shown, except as affected by the tolerances herein specified and by the provision for alternative design.

TABLE 2 Physical Test Requirements for Standard and Heavy-Duty Concrete Drainage Pipe^A

Internal Designated Diameter, mm	Standard Drainage Pipe		Heavy-Duty Drainage Pipe	
	Thickness of Wall, mm	Minimum Three-Edge-Bearing Load, kN/linear m	Thickness of Wall, mm	Minimum Three-Edge-Bearing Load, kN/linear m
100	19	17.5	19	20.5
125	19	18.0	19	20.5
150	22	19.0	22	20.5
200	25	19.5	25	22.0
250	29	20.5	29	22.5
300	32	22.0	32	25.0
350	35	23.5	38	27.0
375	38	24.0	38	29.0
400	38	25.0	41	30.5
450	44	26.5	50	34.0
500	50	27.0	57	36.5
525	54	27.5	57	39.0
600	57	29.0	63	44.0

^A For absorption test requirements, refer to 10.4.