

American Water Works Association

AWWA C701-88

(Revision of ANSI/AWWA C701-78)



AWWA STANDARD
FOR
COLD-WATER METERS— TURBINE TYPE,
FOR CUSTOMER SERVICE



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Foreword

This foreword is for information only and is not a part of AWWA C701.

I. History of Standard. A booklet published in Hamburg, Germany, in 1790 by Benjamin Gottlob Hoffman described a form of current meter developed by Reinard Woltman that may be considered to be the first practical meter for measuring flowing air and water. Originally, it was thought that the meter could not be adapted for use in enclosed pipe. However, through substantial changes in design and construction, the present current meter evolved.

The first AWWA specifications for water meters of various types were published in 1923. These were revised in later years, and the first standard that dealt solely with current type meters was approved July 25, 1947. It was AWWA C701-47, Standard Specifications for Cold-Water Meters—Current Type. The standard was revised in 1970 and designated AWWA C701-70, Standard for Cold-Water Meters—Turbine Type for Customer Service.

Between 1923 and 1947 the propeller-type current meter was developed for pump-station discharge, irrigation, and main line measurement. This meter differs from the original design in that it does not use a measuring cage around the turbine. The propeller operates directly within the pipeline itself or within the main meter body. The propeller-type meters had operating characteristics different from current-type meters; these differences led to the development of AWWA C704-50, Standard Specifications for Cold-Water Meters—Current Type, Propeller Driven. This standard was revised in 1970 and designated as AWWA C704-70, Standard for Cold-Water Meters—Propeller Type for Main Line Applications. The 1970 version was reaffirmed without revision in 1975 and 1984.

The 1978 revision of AWWA C701 included an added distinction between class I and class II types of turbine meters. Class I meters are those previously covered by AWWA C701-70 and class II meters are the newer in-line high-velocity type characterized by lower head loss, greater low-flow sensitivity, and tighter accuracy tolerances over a wider flow range. Details of the performance differences are listed in Table 1 of AWWA C701.

II. Information Regarding Use of This Standard. This standard provides for several options and alternatives that the purchaser must specify if choosing to exercise the options or if there is a preference among the alternatives. In addition, several items must be specified by the purchaser to describe completely the type, size, quantity, and other characteristics of the meters required. All such items, options, and alternatives are summarized in the following list. The purchaser should review each item in the list and then make the appropriate provisions in the supplementary specifications to describe specific requirements.

1. Standard used—that is, AWWA C701, Standard for Cold-Water Meters—Turbine Type, for Customer Service.
2. Meter class—class I or class II (Sec. 1.1).
3. Whether an affidavit of compliance (Sec. 1.4) and certificate of testing for accuracy (Sec. A.3.3) are required.
4. Whether a specific warranty is to be required (Sec. 1.5).
5. Whether pressure castings (main casings) are to be made of copper alloy or of cast iron treated for corrosion resistance (Sec. 2.2), and whether there is a prefer-

Table F.1 Metric Conversion Factors

US Customary Unit	Conversion Factor	Metric Equivalent
inches (in.)	$\times 25.4$	= millimetres (mm)
gallons (gal)	$\times 3.785412 \times 10^{-3}$	= cubic metres (m ³)
cubic feet (ft ³)	$\times 2.831685 \times 10^{-2}$	= cubic metres (m ³)
pounds per square inch (psi)	$\times 6.894757$	= kilopascals (kPa)
pounds per square inch (psi)	$\times 6.894757 \times 10^{-3}$	= megapascals (MPa)
degrees Fahrenheit (°F)	$- 32 \times 5/9$	= degrees celsius (°C)

ence for the materials specified for the various meter components (Sec. 2.3 through Sec. 2.10).

6. Size of meter (Sec. 3.1 and Tables 1 and 2) and quantity required.

7. Type of connections for 1½-in. and 2-in. meters, whether couplings (tail-pieces) are to be furnished on meters with spuds, and whether round or oval flanges are required on flanged meters (Sec. 4.3.1).

8. Whether companion flanges, gaskets, bolts, and nuts (Sec. 4.4) are to be furnished with flanged meters.

9. Details of register (Sec. 4.5) to be furnished, including

a. unit of measure—US gallons, cubic feet, cubic metres, or other.

b. position—permanently sealed or open.

c. test hand—with or without sweep test hand.

10. Whether a direct-reading remote register or an encoder-type register is required (Sec. 4.6).

11. Special materials required, if any, to resist corrosion if water is highly aggressive (Sec. A.5.3).

III. Major Revisions. The major changes from the 1978 standard made in this revision are:

1. A definitions section has been added (Sec. 1.2).

2. Sec. 1.5.2 now states that AWWA standards do not include warranties.

3. References to hermetically sealed registers have been modified to list permanent seals (Sec. 4.5).

4. Sec. 4.10 now refers to tamper-resistant features rather than just seal-wire holes.

5. The appendix attached to AWWA C701 has been updated.

6. The term *engineering plastic* replaces the term *synthetic polymer* throughout the standard.

7. Numerous modifications to conform to modern AWWA form and content have been added.

8. Metric units have been included where appropriate. Conversion factors are listed in Table F.1.