

American Water Works Association

AWWA STANDARD
for
TESTING COLD-WATER METERS

This "Standard for Testing Cold-Water Meters" is based upon competent experience and is intended for use under normal conditions. The procedure is not intended for use under all conditions.

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Latest Revisions to C705

This document was made Standard, without revision, on May 20, 1960. As a result, the designation has been changed from C705-57T to C705-60.

Foreword

The proposed standard procedure has been prepared to fill a void which has existed for many years. In the past, there have been no nationally recognized water meter testing procedures. The closest approach to standard test procedures has been the accuracy requirements contained in the various AWWA meter specifications, and these have been widely used as a basis for establishment of individual testing methods. With the exception of specific rates set forth for testing meters on a minimum flow, however, those specifications make no provision for the number of different rates of flow on which meters should be tested, what these various rates of flow should be, or the quantities of water to be used in running such tests. It is understandable that the meter specifications do not contain these provisions, as the accuracy requirements are primarily a warranty to the buyer that meters purchased in accordance with the specifications will register within certain accuracy limits. The confusion and wide variance in testing procedures result from the fact that the testing of water meters in ordinary shop practice is primarily concerned with meters which are not new, but which have been removed from service, often after many

years, and repaired. Each individual has had to start with whatever information was available and to develop his own testing procedures. Obviously, under such circumstances, it is not difficult to understand the reason for the widely divergent procedures that have developed over the years, many of which do not produce reasonable answers on overall operational ability of the meters tested.

In considering what the committee should recommend as standards, a review was made of all the various state commissions' rules, as well as the results of a survey of water meter testing practices, conducted in 1954, covering approximately 300 different utilities throughout the country. This report did little more than confirm the wide variations which were believed to exist. It was therefore decided that the committee should place most emphasis on the basic factors involved, in order that the recommended rates, quantities, and accuracy limits finally selected would insure proper determination of the condition of meters. An outline of these basic factors has been made a part of this document for informative purposes, as well as to show the basis for the conclusions reached by the committee.

AWWA Standard for Testing Cold-Water Meters

This document is designed to provide reasonable standards by which accuracy of water meters used for normal customer service may be determined.

Factors Involved

The three basic factors involved in testing water meters are:

1. The number of different rates of flow over the operating range of a meter required to determine overall meter efficiency.

2. The quantities of water necessary at the various test rates to provide reasonable determination of meter registration.

3. Accuracy limits which meters must meet on the different rates to be acceptable for use.

Test Rates

Three rates of flow are necessary properly to test water meters of positive displacement and current types. These are usually referred to as "maximum," "intermediate," and "minimum" rates of flow. At least one additional test, and preferably more, is necessary within the "changeover" range of flows of compound meters to determine overall operational efficiency and accuracy of registration.

The *maximum rate* of flow is often selected as the rated meter capacity. Registration curves of water meters show that positive displacement and current types of meters in good operating condition follow a general pattern of registration. Above the very low flows which the meter will not register,

there is an intermediate point of maximum registration. Above and below this point, lower registration is obtained. The maximum point of registration depends on meter design but is usually around 10 per cent of rated meter capacity. At rates above that of maximum registration, the accuracy curve is fairly flat, so that there is little difference in accuracy over a wide range of flows. Selection of the maximum rate of flow at which meters are tested, therefore, is not of major importance. Maximum-rate test flows of approximately three-fourths of rated capacity are practical, particularly since meters are seldom operated at rated capacity. This lower test rate is advantageous when testing meters in multiple and is possible of attainment with pressure and testing equipment usually available.

The *intermediate rate* of flow should be at or near the high point of registration to insure against overregistration of the meter on any rate of flow. It should, therefore, be about 10 per cent of rated capacity.

The *minimum rate* of flow test does more to disclose operational ability and proficiency of meter repair than either the maximum or intermediate flow tests. All three, however, are necessary to evaluate overall meter accuracy.

Test rates of flow should be based on actual quantities such as "gallons per minute," or "cubic feet per minute." Rates calculated on the basis of pressure and size of orifice are not reliable because of the possible enlargement of orifice opening from wear or changes in pressure during tests.