INTERNATIONAL STANDARD

**ISO 7858-1**

Second edition
1998-07-15

# Measurement of water flow in closed conduits — Combination meters for cold potable water —

## Part 1: Specifications



*Mesurage de débit d'eau dans les conduites fermées — Compteurs combinés d'eau potable froide —*

*Partie 1: Spécifications*

## Contents

Page







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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.



International Standard ISO 7858-1 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 7, *Volume flowrate methods.*



This second edition cancels and replaces the first edition (ISO 7858-1:1985), which has been technically revised.

ISO 7858 consists of the following parts, under the general title *Measurement of water flow in closed conduits — Combination meters for cold potable water:*

— *Part 1: Specifications*

— *Part 2: Installation requirements*

— *Part 3: Test methods*

# Measurement of water flow in closed conduits — Combination meters for cold potable water —

# Part 1:
Specifications

## 1 Scope

This part of ISO 7858 defines the characteristics specific to combination meters as described in clause 4 for the measurement of flow of cold potable water in closed conduits.



## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 7858. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7858 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.



ISO 4064-1:1993, *Measurement of water flow in closed conduits — Meters for cold potable water — Part 1: Specifications.*

## 3 Definitions

For the purposes of this part of ISO 7858, the following definitions apply.

NOTE In this part of ISO 7858, the capital letter $Q$ signifies the flowrate of the combination meter, the lower case letter $q$ signifies the flowrate of one of the component meters, completed by the subscript 1 or 2 according to whether it refers to the large or small meter or measuring element.

**3.1**
**overload flowrate**
$Q_s$
<combination meter> overload flowrate $q_{s1}$ of the large meter or large measuring element

See ISO 4064-1.

**3.2**
**minimum flowrate**
$Q_{min}$
<combination meter> minimum flowrate $q_{min2}$ of the small meter or of the small measuring element

**3.3**
**transitional flowrate**
$Q_t$
flowrate at which the maximum permissible error of the combination meter changes in value

NOTE The value $Q_t$ characterizes the total flowrate of the three elements comprising the combination meter as defined in clause 4. This value is equal to:

— either the transitional flowrate $_{t2}$ of the small meter or measuring element;

— or the transitional flowrate $q_{t1}$ of the large meter or measuring element.

**3.4**
**permanent flowrate**
$Q_p$
<combination meter> permanent flowrate $q_{p1}$ of the large meter or measuring element

**3.5**
**designation *N***
***N*-value**
<combination meter> *N*-value of the large meter or measuring element

**3.6**
**flowrate range**
<combination meter> range limited by the overload flowrate $q_{s1}$ of the large meter or measuring element and by the minimum flowrate $q_{min2}$ of the small meter or measuring element



**3.7**
**pressure loss**
system pressure loss caused by the presence of the complete combination meter



## 4 Versions of combination meter

### 4.1 General

This part of ISO 7858 is only to be applied in conjunction with ISO 4064-1, the provisions of which shall be complied with. In particular, the large and small meters shall be complete meters conforming to ISO 4064-1, except for modifications of the meter casings necessary for the interconnection of the component meters forming the combination meter. These casing modifications shall have no metrological effect upon the component meters.

### 4.2 Classic version

The combination meter in the classic version comprises three components:

— one large meter conforming to ISO 4064-1;

— one small meter conforming to ISO 4064-1;

— one changeover device functioning automatically without using any source of energy other than that of the fluid being measured.

Depending on the flowrate of the water passing through the combination meters, this changeover device directs the water:

— either through the small meter at low flowrates, and then through the large meter only at higher flowrates;

— or through the small meter at low flowrates, and then through both meters at higher flowrates.

$q$

The indicating device of each of the component meters displays a part of the total quantity; the reading of the total volume that has flowed through the combination meter requires the addition of the readings of each of the two meters.

In any case, the relevant requirements of ISO 4064-1 shall be complied with.

### 4.3 Integrated version

The combination meter in the integrated version comprises :

— an assembly integrating whole or part of the functions of the components under 4.2, within the same envelope;

— the function of the changeover device remaining identical to that of 4.2;

— the reading of the total volume that has flowed through the combination meter can be obtained from:

1) either two independent totalizers as described in 4.2;

2) or one totalizer which adds up the values from both components.

In any case, for the functions of the integrated components described in this part of ISO 7858, the requirements of ISO 4064-1 are fully applicable.

## 5 Technical characteristics



The technical characteristics are those of ISO 4064-1 with the following modifications and additions.



### 5.1 Dimensions (see figure 1)



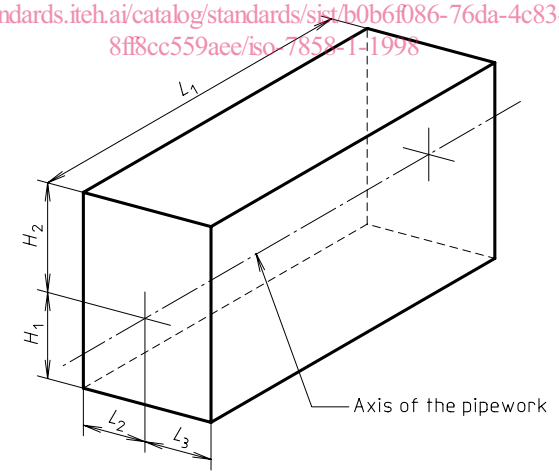


**Figure 1**

#### 5.1.1 Length, $L_1$

The overall length of a combination meter may be a fixed dimension, in the same way as simple meters, or may be adjustable by means of a sliding coupling. In this case, the minimum possible adjustment of the meter overall length shall be ± 15 mm relative to the nominal value of $L_1$ defined in table 1.

#### 5.1.2 Breadths $L_2$ and $L_3$

However the various components of the combination meter are arranged, the values of $L_2$ and $L_3$ given in table 1 shall not be exceeded.

### 5.1.3 Heights $H_1$ and $H_2$

Because of the wide variations in the height of the various types of combination meter, it has not been possible to standardize these dimensions.

**Table 1**

Dimensions in millimetres

| Size DN[1)] | $L_1$ Tolerances $^{0}_{-3}$ ($200 \leq L_1 \leq 400$) $^{0}_{-5}$ ($400 \leq L_1 \leq 1\,200$) | | $L_{2max}$ and $L_{3max}$ |
|---|---|---|---|
| | short | long | |
| 50 | 300 | 600 220 | |
| 65 | 300 | 650 | 240 |
| 80 | 350 | 700 | 260 |
| 100 | 350 | 800 | 350 |
| 150 | 500 | 1 000 | 400 |
| 200 | 500 | 1 200 | 400 |

1) DN: nominal diameter of flange connection.

## 5.2 Changeover device



In the case where the transitional flowrate of the combination meter, $Q_t$, is equal to that of the small meter or measuring element, the changeover shall take place in such a manner that the large meter or measuring element is never subjected to a flowrate less than its minimum flowrate $q_{min1}$.



The changeover device shall function in such a manner that:

— the large meter or large measuring element never operates at a flowrate less than its minimum flowrate $q_{min1}$;

— the small meter shall never be submitted to a flowrate exceeding 1,2 $q_{p2}$.

The device shall have resistance to wear and reliability comparable to that of the component meters or measuring elements. If the changeover device can operate only in a horizontal or vertical position, it shall include a levelling aid (reference plane or spirit level) allowing its correct installation.

## 5.3 Marking

Combination meters shall be clearly and indelibly marked with the following:

a) the name or trademark of the manufacturer, or registered trademark;

b) the year and serial number of manufacture;

c) $Q_{min}$, $Q_t$ and $Q_p$ of the combination meter;

d) one or more arrows indicating the direction of flow;

e) type approval mark;

f) maximum working pressure, in bars, if in excess of 10 bar (1 bar = $10^5$ Pa);

g) the pressure loss group;

h) designation (*N*) of the meter;

i) letter V or H if the meter can only operate in a vertical or horizontal position, respectively;

j) connection size [or nominal diameter of the meter (DN)], if the size differs from the value indicated in tables 1 and 2 of ISO 4064-1:1993.

The meters and measuring elements constituting the combination meter may be marked in accordance with ISO 4064-1. One or more of the above mandatory indications may be grouped in the component meter markings.

### 5.4 Seals

Combination meters shall have protection devices which shall be sealed in such a way that, both before and after the combination meter has been correctly installed, there is no possibility of dismantling or altering the combination meter, the component meters or elements, the changeover device or their adjustment devices, without damaging the protection devices.

## 6 Metrological characteristics

### 6.1 Changeover zone

The zone of the flowrate range affected by the action of the changeover devices shall be as narrow as possible.

The manufacturer's catalogue and, if there is a national requirement for one, the pattern approval certificate shall stipulate the flowrate zone in which the changeover occurs with both increasing and decreasing flow.

The action of the changeover device shall not result in exceeding the maximum permissible errors defined in 6.2.



### 6.2 Maximum permissible errors

The maximum permissible error in the zone between $Q_{min}$ inclusive and $Q_t$ exclusive is ± 5 %.



The maximum permissible error in the zone between $Q_t$ inclusive and $Q_s$ inclusive is ± 2 %.

## 7 Pressure loss

According to the test results, combination meters are divided into four groups according to which of the following maximum values their pressure loss complies with over the whole flowrate range:

— 1 bar;

— 0,6 bar;

— 0,3 bar;

— 0,1 bar.