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Service activities relating to drinking water supply, wastewater and stormwater systems — Guideline for a water loss investigation of drinking water distribution networks

Activités relatives aux systèmes d'eau potable, d'assainissement et de gestion des eaux pluviales — Lignes directrices pour l'investigation des pertes d'eau dans les réseaux de distribution d'eau potable

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply, wastewater and stormwater systems.*

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Water is essential to life and forms part of the environment. Global concern for the state of the environment has identified that water resources are subject to significant pressure from water demand. Large amounts of abstracted water do not reach the intended users. Many water utilities lose large volumes of water through leaks and pipe bursts. Due to increasing urbanization, growing demand, rising costs and ageing distribution networks, water loss is a growing challenge for drinking water utilities.

In addition to the failure rates, the amount of water lost from a network is also an indicator of the condition of that network, which can only be improved through appropriate operation, maintenance and long-term rehabilitation. Still, careful handling of water is a fundamental requirement for drinking water utilities.

Identifying and reducing water loss is an important task in the overall concept of managing of water distribution network assets (see ISO 24516-1:2016, 4.1; 5.8). Minimizing water loss is a major functional requirement in fulfilling the objectives given in ISO 24510 regarding promoting the sustainability of the drinking water utility, protecting the environment and protecting public health and safety.

A system water loss investigation can contribute to the sustainability of drinking water utilities and protection of the environment. It is a critical first step in the establishment of an effective water loss management programme, which is an important activity within the management of water distribution assets. With a successful completion of a system water loss investigation, water utilities can gain an understanding of the current status of the drinking water distribution network regarding non-revenue water (NRW) components (i.e. unbilled authorized use, apparent water loss and real water loss) and begin to formulate a water loss management plan.

Water loss consists of real and apparent water loss. Real water loss includes the treated water volume lost through all types of leaks in pipes and other components of the system, as well as storage tank overflows. It also depends on flow rates, water loss rates, pressure and the average duration of individual leaks and the frequency at which they occur. Apparent water loss covers all types of inaccuracies associated with users' metering and billing, plus unauthorized use (theft or illegal use). Unauthorized use occurs through deliberate actions of authorized or unauthorized users who draw water from the system without permission. Such water loss can take many forms, including illegal connections, illegal reconnections of disconnected users, meter bypasses, meter tampering and illegal connections to fire hydrants. This document deals with the various components of water loss as part of the water loss investigation.

The International Water Association Water Loss Specialists Group (IWA WLSG) has developed terminology, methodology, strategy and diverse tools for water loss management. This document includes and considers these.

The purpose of this document is to establish current know-how in water loss and to set a formalized scope of work for water loss investigation. It also includes an annex that describes relevant technologies and methods.

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1 Scope

This document provides a methodology for undertaking a water loss investigation and establishing general principles for water loss management in drinking water distribution networks in order to improve the sustainability of drinking water utilities and protect the environment by saving water, energy and use of chemicals.

This document establishes a procedure to estimate water loss components through water balance calculations and to define general principles of water loss management. This document deals with the preparation of a water loss management plan for water loss reduction and management projects but does not cover its execution.

This document does not cover bulk drinking water supply systems, but can relate to pumping, storage and transmission within the drinking water distribution network.

This document can be used analogously for non-public supply systems, raw water and industrial water systems.

This document is intended for drinking water utilities and other stakeholders.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
active leakage control
ALC
process of undertaking leakage detection surveys on a targeted or regular basis in order to manage leakage within a *drinking water distribution network* (3.10)

3.2
apparent water loss
unauthorized use of water, such as theft or illegal use of water, and any inaccuracies associated with errors in metering, errors in estimation of unmetered water use and errors arising from the data acquisition and analysis process