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Guidelines for treated wastewater use for irrigation projects —

Part 7: Golf courses and other sports fields

Lignes directrices pour l'utilisation des eaux usées traitées dans des projets d'irrigation —

Partie 7: Terrains de golf et autres terrains de sport

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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).

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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 282, *Water reuse*, Subcommittee SC 1, *Treated wastewater reuse for irrigation*.

A list of all parts in the ISO 16075 series can be found on the ISO website.

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.

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Introduction

Treated wastewater (TWW), also referred to as reclaimed water or recycled water, can be used as a reliable alternative for irrigation to maintain turfgrass areas of golf courses and other sports fields (e.g. football, rugby, cricket). The use of TWW combined with adequate irrigation practices of turfgrass can be a water conservation measure with significant potential.

The use of TWW as an alternative to freshwater, especially drinking water, for the irrigation of golf courses and other sports fields can have a positive impact on activities associated with sports, tourism and contributes to regional economic development and a sustainable environment.

When swimming pools are integrated in sports centres, the water from filter cleaning can be recovered and reused for irrigation. This is a significant amount of water which, together with greywater from showers and hand basins from sports centres, represents after adequate treatment a viable source for irrigation. Thus, the use of treated greywater (TGW) in sports centres represents a significant opportunity to reduce the exploitation of freshwater resources.

However, the use of TWW and TGW can also have detrimental effects on turfgrass, soil and freshwater resources, as well as on public health. Despite the similarity to the use of TWW for agriculture irrigation, some specific aspects need to be taken into account to optimize the use of TWW and TGW for the irrigation of sports fields, such as:

— turfgrass maintenance according to sport requirements;

— health aspects related with a higher level of direct human contact with turfgrass;

— barriers that can be applied;

— TWW treatment potential associated with water storage ponds in golf courses;

— TWW and TGW characteristics.

This document intends to support operators of golf courses and other sports fields with the implementation of a water reuse system for turfgrass irrigation. The document intends to support regulatory authorities, stakeholders or practitioners, or all of them, to establish guidelines to ensure water reuse for irrigation is safe for human health and for the environment and does not have a negative effect on the quality of the turfgrass, promoting public acceptance of the practice.

Risk assessment and risk management for the safe use of TWW and TGW in irrigation projects are addressed in ISO 16075-2 and ISO 20426, respectively.

General aspects of project design, development, components and monitoring are addressed in ISO 16075-1, ISO 16075-2, ISO 16075-3 and ISO 16075-4, respectively. The disinfection treatment options are addressed in ISO 16075-5 and the fertilization aspects are addressed in ISO 16075-6.

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Guidelines for treated wastewater use for irrigation projects —

Part 7: Golf courses and other sports fields

1 Scope

This document provides guidelines for the use of treated wastewater (TWW) and treated greywater (TGW) for the irrigation of golf courses and other outdoor sports fields.

This document covers aspects for the irrigation of turfgrass in golf courses and other sports fields, including:

— public health aspects;

— agronomic aspects.

Additionally, this document provides guidance for the recovery and treatment of water from swimming pool operations for the irrigation of sports fields.

NOTE This document is not intended to be used for certification purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20670, *Water reuse — Vocabulary*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 20670 and the following apply.

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

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

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

3.1 Terms and definitions

3.1.1
backwash
reverse flow of water with or without air across a filter (i.e. from permeate side to feed side)

Note 1 to entry: It is designated to remove the deposited foreign substances (foulants) from the filter.

[SOURCE: ISO 20468-5:2021, 3.1.1, modified — In the Note 1 to entry, “membrane” was changed to “filter”.]

3.1.2
turf
upper stratum of soil bound by grass and plant roots into a thick mat

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3.1.3
turfgrass
variety of grass species grown to form a turf, which is maintained at a short height by mowing and is used to provide a green surface covering for gardens, parks and sports playing areas

3.2 Abbreviated terms

TGW treated greywater

TWW treated wastewater

4 Irrigation of golf courses and other sports fields with TWW and TGW

4.1 Irrigation of golf courses

4.1.1 General

A golf course is a large outdoor area, mainly covered with turfgrass and designed for playing the sport of golf. Each golf course provides a different set of challenges depending on its design and location, among other aspects. A standard round of golf consists of 18 holes; 9-hole courses are also common. Each hole is constituted by a teeing ground, a fairway, a green and various obstacles (i.e. hazards). The fairways are surrounded by roughs. The golf courses often have sections for golfers to practice on – the driving range and the putting green area. The turfgrass used on golf courses should be resistant to heavy foot traffic without breaking and resilient to be cut at very low height. Different mowing patterns are applied to the different areas of a golf course, as presented in Table 1.

Table 1 — Playable areas in a golf course

Type	Function	Notes on turfgrass
Teeing ground	To start the hole.	Tees suffer constant divot [a] damage. For that reason, turf should be dense and robust. The closely mowed turfgrass and the traffic damage need increased irrigation and fertilization.
Fairway	To establish the ideal route between the tee and the green.	The fairway turfgrass height depends on the type of grass in use, soil conditions and local climate, among other aspects.
Green	To complete the hole (it is where the flagstick is located).	Greens are maintained with very closely mowed grass to allow precision strokes on it. Usually, turfgrass is grown on highly draining soil (usually sand). Like tees, the reduced height of cut and excessive traffic damage result in higher values for irrigation and fertilization.
Rough	To punish inaccurate shots that fail to do the fairway, making more difficult to hit the ball.	The turfgrass is deliberately kept higher than the fairway. Rough can be the largest turf area to mow; two turf heights can be applied (first rough and second rough). Most golf courses have turfgrass on the rough, but not all. For example, golf courses in arid areas can use natural vegetation for this purpose.
Driving range	To practice the swing skill.	The turfgrass is maintained like the fairways.
Putting green	To practice the putting skill.	The turfgrass is maintained like the greens.

[a] A divot is a small hole in an area of grass, especially one made by a golf club or ball, i.e. a piece of grass that has been cut out, leaving such a hole.

In addition to turf areas, a golf course includes non-turf areas that constitute obstacles for golfers: water hazards, such as ponds and creeks, and bunkers, which are depressions usually filled with sand.

In addition to playing areas, golf courses include landscaping areas and facilities, such as the clubhouse and car parks. These sites are related to the irrigation system in various ways, as presented in Table 2.

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