ISO/TC 282/SC 1/WG 1 "Treated wastewater use for irrigation projects"
Convenorship: **SII**
Convenor: **Tarchitzky Jorge Dr.**

NWIP_ ISO 16075-7 -golf

Document type	Related content	Document date	Expected action
Meeting / Presentation	Meeting: VIRTUAL 8 Jun 2022	2022-06-19	**INFO**

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Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

ISO TC 282: Spring meeting May 2017 (Olhão, Portugal)

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ISO/TC 282 SC1 Meeting (online), 2022.06.08

Outlines

1. Background
2. Purpose and justification of the proposal
3. Proposed outline of the proposal

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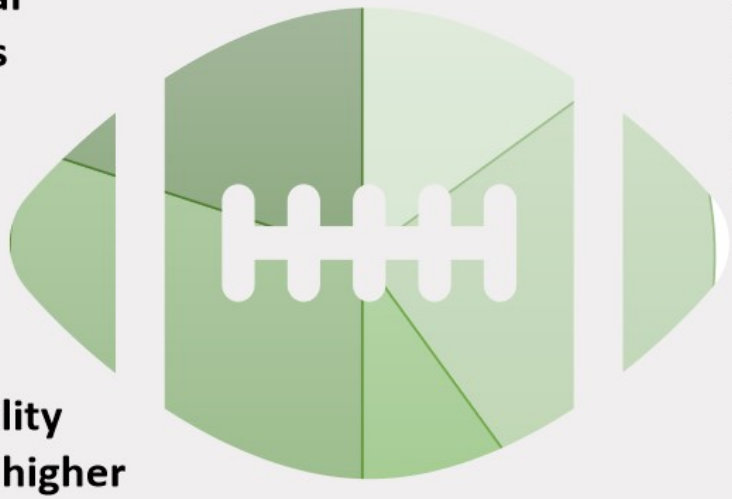
Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

Background

ISO/TC 282 SC1 Meeting (online)
2022.06.08

1.1 Turfgrass covers in sports

- Natural grass field provides a safe playable surface that is natural and pleasing to users (players, coaches, families)



- Dense aboveground turfgrass biomass traps and holds water which reduces excess runoff and allows more water to infiltrate into the soil. 1 ha can absorb up to 23 m^3 of water

- Fields with good quality turfgrass cover have higher traction, cushioning, and resiliency, and lower surface hardness, reducing the probability of injury in contact sports

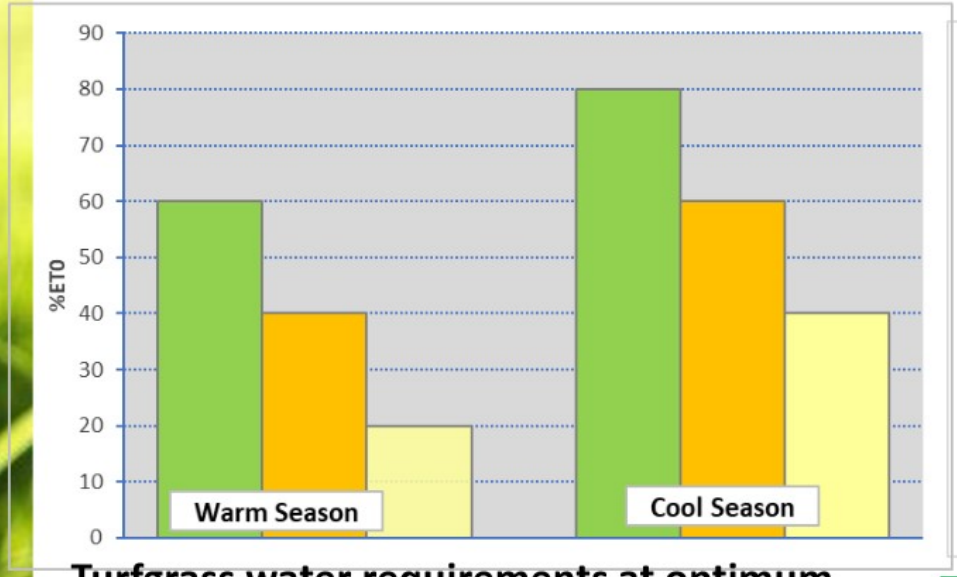
- An extensive, fibrous turfgrass root system filters water percolating through the soil to enhance groundwater recharge





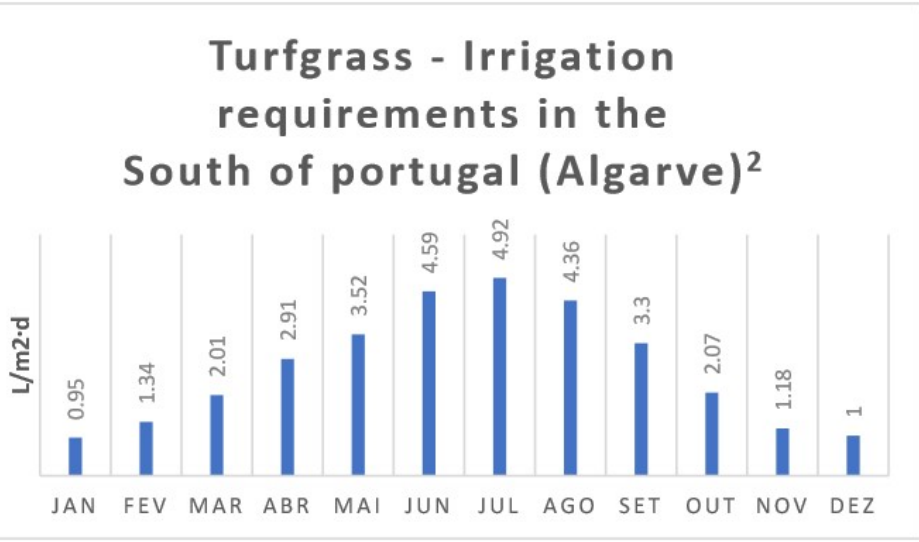


1.2 Water Requirements for turfgrasses



Turfgrass water requirements at optimum, deficit and survival levels of irrigation[1]

ET_0 – Reference evapotranspiration



Main issues:

- **Water quality (agronomic aspects)**
  - **Nutrients (N and P recovery)**
  - **Salinity**

Water reuse can meet the water demand in sport fields but it is necessary to address the particularities associated with their irrigation;

[1] Harivandi, M. A.; Baird, J.; Hartin, J.; Henry, M.; Shaw, D. Managing Turfgrasses during Drought. ANR Publication 2009, 9. 8395

[2] Rosa, A. Contributos para estimar a rega em campos de golfe e espaços arrelvados na região do Algarve. Resultados de estudos realizados Ensaios realizados, há já alguns anos, no Centro de Experimentação Hortofrutícola do Patacão (entre 86/87 e 96/97), Faro

1.3 Water reuse for sport fields' irrigation

- Golf courses
  - ✓ large quantities of treated wastewater can be beneficially used by one user
- Other sports fields
  - ✓ integrated in the urban area, close to the production site of the treated wastewater/greywater

Treated wastewater quality (nutrients, salts and pathogens) differs from drinking water or rainfall → impact on vegetation, soil and public health



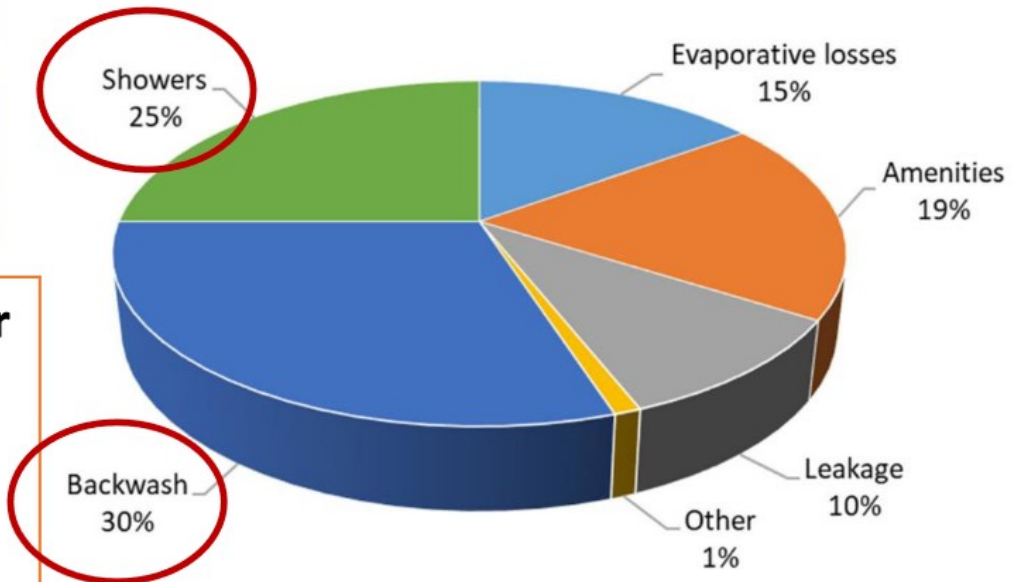




1.4 Sports Complex

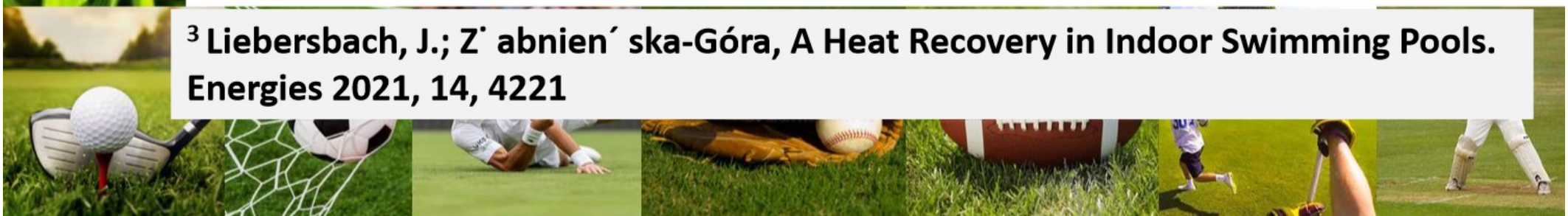
- **Water reuse sources**
  - **Water from swimming pool filters (backwashing)**
  - **Showers (before and after bathing)**

Water consumption in a typical community pool[3]



Total water consumption in indoor swimming: 145-210 L/(person.d)

Shower before and after bathing: 50 to 80 L/(person.d)[3]



[3] Liebersbach, J.; Z˙ abnien´ ska-Góra, A Heat Recovery in Indoor Swimming Pools. Energies 2021, 14, 4221

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Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

Purpose and justification of the proposal

ISO/TC 282 SC1 Meeting (online)
2022.06.08

Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

PURPOSE

The aim of ISO 16075-7 is **to guide on best practices and barriers** that may be used for water reuse in golf courses' and other sport fields' irrigation to protect human health, **as well as on agronomic aspects** to promote good turfgrass condition.

This International Standard will support golf courses' and other sport fields' operators implementing a water reuse system for turfgrass irrigation, as well as authorities, stakeholders and/or practitioners, to enable water reuse that is safe in terms of human health and does not affect the quality of the turf.

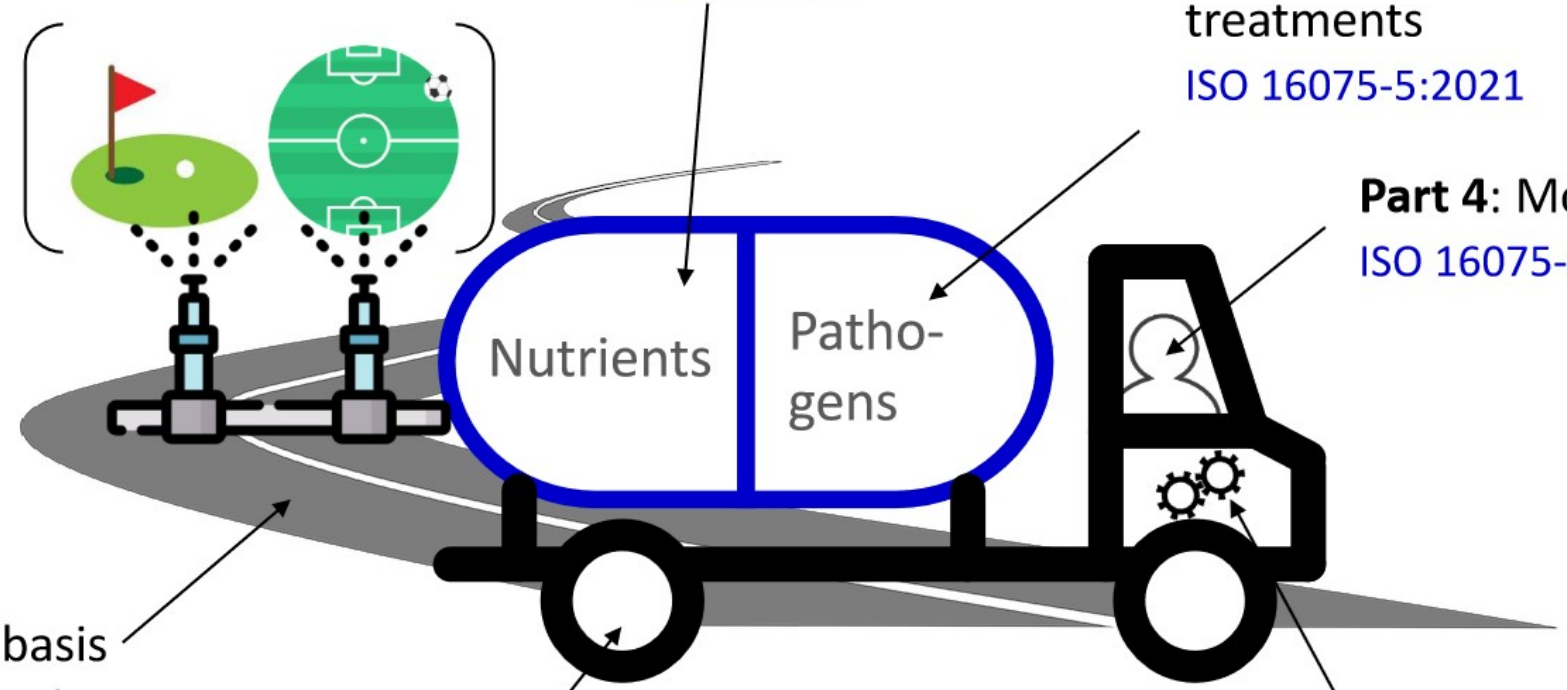
ISO 16075 Guidelines for treated wastewater use for irrigation projects

Part 7: Golf courses and other sport fields
PROPOSAL

Part 6: Fertilization
CD 16075-6

Part 5: Treated wastewater disinfection and equivalent treatments
ISO 16075-5:2021

Part 4: Monitoring
ISO 16075-4:2021



Part 1: The basis of a reuse project for irrigation
ISO 16075-1:2020

Part 2: Development of the project
ISO 16075-2:2020

Part 3: Components of a reuse project for irrigation
ISO 16075-3:2021

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Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

Proposed outline of the proposal

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Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

DRAFT OUTLINE

Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

DRAFT OUTLINE

4 Irrigation of golf courses and other sport fields with turfgrass

4.1 Golf courses

4.1.1 Particular features of the turfgrass and other vegetation in the different components of a golf course

4.1.2 Specific aspects of the irrigation practice

4.2 Sports fields

4.2.1 Particular features of the turfgrass

4.2.2 Specific aspects of the irrigation practice

Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

DRAFT OUTLINE

5 Public health aspects

5.1 TWW and treated greywater quality

5.2 Barriers

5.2.1 Golf courses

5.2.2 Sports fields

6 Agronomic aspects

6.1 TWW quality

6.2 Salinity

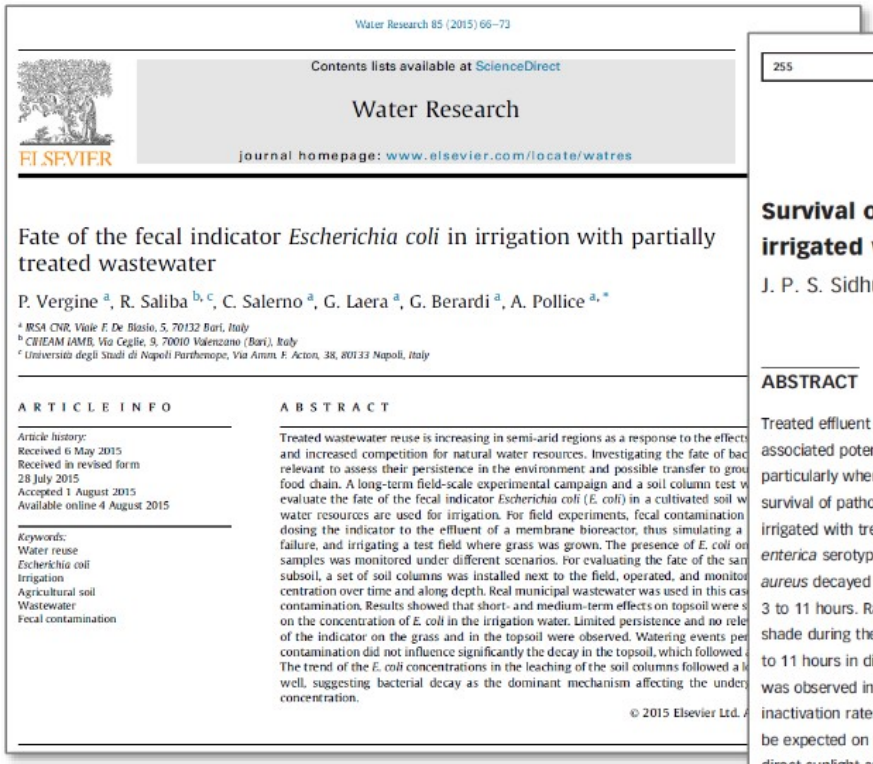
6.3 SAR

6.4 …

Guidelines for treated wastewater use for irrigation projects – Part 7: Golf courses and other sport fields

DRAFT OUTLINE

Annex A (informative) **Determination of the survival of pathogenic and indicator microorganisms on the turfgrass surface**



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Fate of the fecal indicator *Escherichia coli* in irrigation with partially treated wastewater

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ABSTRACT

Treated wastewater reuse is increasing in semi-arid regions as a response to the effects and increased competition for natural water resources. Investigating the fate of bac relevant to assess their persistence in the environment and possible transfer to grou food chain. A long-term field-scale experimental campaign and a soil column test w evaluate the fate of the fecal indicator *Escherichia coli* (*E. coli*) in a cultivated soil w water resources are used for irrigation. For field experiments, fecal contamination dosing the indicator to the effluent of a membrane bioreactor, thus simulating a failure, and irrigating a test field where grass was grown. The presence of *E. coli* on samples was monitored under different scenarios. For evaluating the fate of the san subsoil, a set of soil columns was installed next to the field, operated, and monitor centration over time and along depth. Real municipal wastewater was used in this cas contamination. Results showed that short- and medium-term effects on topsoil were s on the concentration of *E. coli* in the irrigation water. Limited persistence and no rele of the indicator on the grass and in the topsoil were observed. Watering events per contamination did not influence significantly the decay in the topsoil, which followed The trend of the *E. coli* concentrations in the leaching of the soil columns followed a l well, suggesting bacterial decay as the dominant mechanism affecting the under concentration.

Survival of enteric microorganisms on grass surfaces irrigated with treated effluent

J. P. S. Sidhu, J. Hanna and S. G. Toze

ABSTRACT

Treated effluent can be reused for the irrigation of parks and sports grounds but there is an associated potential public health risks from microbial pathogens present on the grass surface, particularly when used for contact sports. The main aim of this study was to investigate the survival of pathogenic and indicator microorganisms on the grass surface of a sports ground irrigated with treated effluent under differing climatic conditions. Results showed that *Salmonella enterica* serotype *typhimurium*, *Escherichia coli*, *Enterococcus faecalis* and *Staphylococcus aureus* decayed faster under direct sunlight than MS2 with one $\log_{10}$ reduction (T_{90}) varying from 3 to 11 hours. Rapid decay (T_{90} 3 to 4 hours) of bacterial pathogens occurred in both sunlight and shade during the summer. In contrast, T_{90} times for the bacteria during the winter varied from 6 to 11 hours in direct sunlight and from 23 to 38 hours in shade. No significant seasonal variation was observed in the inactivation of the bacteriophage MS2. Enteric viruses are expected to show inactivation rates similar to MS2. The results show that rapid inactivation of enteric bacteria can be expected on grass surface irrigated with treated effluent at higher ambient temperatures, in direct sunlight and low moisture content.

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Key words | bacteriophage, pathogens, pathogen survival, sports grounds, treated effluent, water reuse

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Thank you for your attention and support!

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