

## Featured Articles

# Contribution to and Future Prospects for ISO/TC 224 and ISO/TC 282 International Standardization Activities in the Water Industry

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*OVERVIEW: Recent years have seen growing activity on international standardization in the water industry. The ISO/TC 224 technical committee dealing with service activities relating to drinking water supply systems and wastewater systems has already been active for 14 years, over which time its scope of activity has continued to expand. Also expanding is the scope of international standardization initiatives aimed at overcoming societal challenges, such as the ISO/TC 282 committee on water re-use and the ISO/TC 268 committee that deals with sustainable development, including water, within communities. This article describes the current status and future prospects of work on international standardization in the water and related industries with reference to the experience of the authors, who serve on the ISO/TC 224 and ISO/TC 282 technical committees.*

## INTRODUCTION

RECENT years have seen growing activity on international standardization in the water industry. The origins of this activity can be traced back to around 2001, when the International Organization for Standardization (ISO), one of the world's standards bodies, approved the establishment of the ISO/TC 224 technical committee for water supply and wastewater services.

The focus of most past standardization had been on product standards that stipulate things like dimensions and materials or methods of measurement. Recent years, however, have seen the emergence of initiatives for service standardization undertaken from a user's perspective, and the standardization of measures or other activities for overcoming societal challenges in their entirety. In the water industry, ISO/TC 224 is one of the main initiatives aimed at service standardization, and there has also been a widening in the scope of activities aimed at overcoming societal challenges, such as the ISO/TC 282 committee on water re-use and the ISO/TC 268 committee that deals with sustainable development, including water infrastructure, within communities.

Hitachi has been contributing to overcoming global challenges through its participation in a wide range

of standardization work in partnership with other interested institutions from both Japan and elsewhere. This article describes the current status and future prospects of work on international standardization in the water and related industries with reference to the experience of the authors, who serve on the ISO/TC 224 and ISO/TC 282 technical committees.

## TRENDS IN INTERNATIONAL STANDARDIZATION FOR WATER

Table 1 lists the main ISO technical committees that deal with water. These are listed in chronological order by date of formation. The committees prior to ISO/TC 224 tended to deal with product standardization and those since with service standardization. In the case of ISO/TC 282, for example, rather than stipulating product specifications for membranes, disinfection systems, and other items used to recycle wastewater, the standardization work focuses on the things that matter to users, such as quality levels and ways of using the water. Rather than supporting existing product markets, these activities can be thought of as being oriented toward the development of new technologies for overcoming problems or the creation of new markets.

TABLE 1. Key ISO Technical Committees Relating to Water (as of September 1, 2015)

Whereas the focus of standardization work prior to the establishment of ISO/TC 224 was on product standards, since then, the focus has been on service standards and on ways of resolving societal challenges.

Committee	Title (Secretariat)
TC 5	Ferrous metal pipes and metallic fittings (China)
TC 23/SC 18	Irrigation and drainage equipment and systems (Israel)
TC 30	Measurement of fluid flow in closed conduits (United Kingdom)
TC 113	Hydrometry (India)
TC 138	Plastics pipes, fittings and valves for the transport of fluids (Japan)
TC 147	Water quality (Germany)
TC 223	Societal security (Sweden) → Merged into TC 292
TC 224	Service activities relating to drinking water supply systems and wastewater systems - Quality criteria of the service and performance indicators (France)
PC 251	Asset management (United Kingdom)
PC 253	Treated wastewater re-use for irrigation (Israel) → Merged into TC 282
TC 255	Biogas (China)
TC 268	Sustainable development in communities (France)
TC 275	Sludge recovery, recycling, treatment and disposal (France)
TC 282	Water re-use (China, Japan)
TC 292	Security and resilience (Sweden)

ISO: International Organization for Standardization TC: technical committee  
SC: sub-committee PC: project committee

Water supply and sewage utilities in Japan are largely run by local governments. Accordingly, most of the contributions by Japan to international standardization for water take the form of public-private collaborations.

## INTERNATIONAL STANDARDIZATION OF WATER SUPPLY AND WASTEWATER SERVICES BY ISO/TC 224

### Background and Current Status of Standardization Work

The establishment of the ISO/TC 224 technical committee on “Service activities relating to drinking water supply systems and wastewater systems - Quality criteria of the service and performance indicators” was prompted by a French proposal to ISO in 2001. It has worked on developing voluntary guidelines, primarily through debate on the establishment of performance indicators (PIs) that can provide quantitative yardsticks for assessing water utilities. The ISO 24510 to 24512 guidelines for service PIs that can be used by the operators and users of water supply and wastewater systems were published in 2007<sup>(1), (2), (3)</sup>.

TABLE 2. ISO/TC 224 Technical Committee Working Groups and Standards (as of September 1, 2015)

The technical committee has had numerous active working groups since the publication of ISO 24510 to 24512.

Working Group	Title	ISO standards (published or under development)
WG 1	Terminology	PWI 24513
WG 2 (Disbanded)	Service to users	ISO 24510:2007 (Published)
WG 3 (Disbanded)	Drinking water	ISO 24512:2007 (Published)
WG 4 (Disbanded)	Wastewater	ISO 24511:2007 (Published)
WG 5	Examples of the application of 2451X Standards	PWI 24514
WG 6	Asset management	DIS 24516-1, PWI 24516-2, CD 24516-3, PWI 24516-4, 24516-5, 24516-6, CD 24523
WG 7	Crisis management of water utilities	ISO 24518:2015 (Published) WD 24520, 24525
WG 8	Onsite domestic wastewater management using low technologies	DIS 24521
WG 9	Decision support systems	AWI 24522
WG 10	Flushable products	24524
WG 11	Storm water management	20325
WG 12	Water efficiency management	24526

WG: working group PWI: preliminary work item AWI: approved work item  
WD: working draft DIS: draft international standard CD: committee draft

A public-private-academia collaboration from Japan actively participated in proposing and critiquing PIs with consideration for their own concerns of maintaining and developing the country’s high level of water supply and wastewater infrastructure. Furthermore, the national standards formulated during this time also cited the international standards.

Work since 2008 has moved on from broad considerations to specific topics, with a series of new working groups (WGs) being set up under the ISO/TC 224 committee. Table 2 lists these ISO/TC 224 WGs and the standards they have produced or are in the process of producing (as of May 1, 2015). While Japan has participated in all of the WGs since 2008, mainly through public agencies, limitations on budget and personnel have presented a challenge. To help overcome this, Hitachi delegated staff to serve on two working groups (WG 7 and WG 9) since 2012 in response to a request from the Japanese committee for water supply issues at ISO/TC 224, and with assistance from relevant local organizations. The following section describes the activities of these WGs.

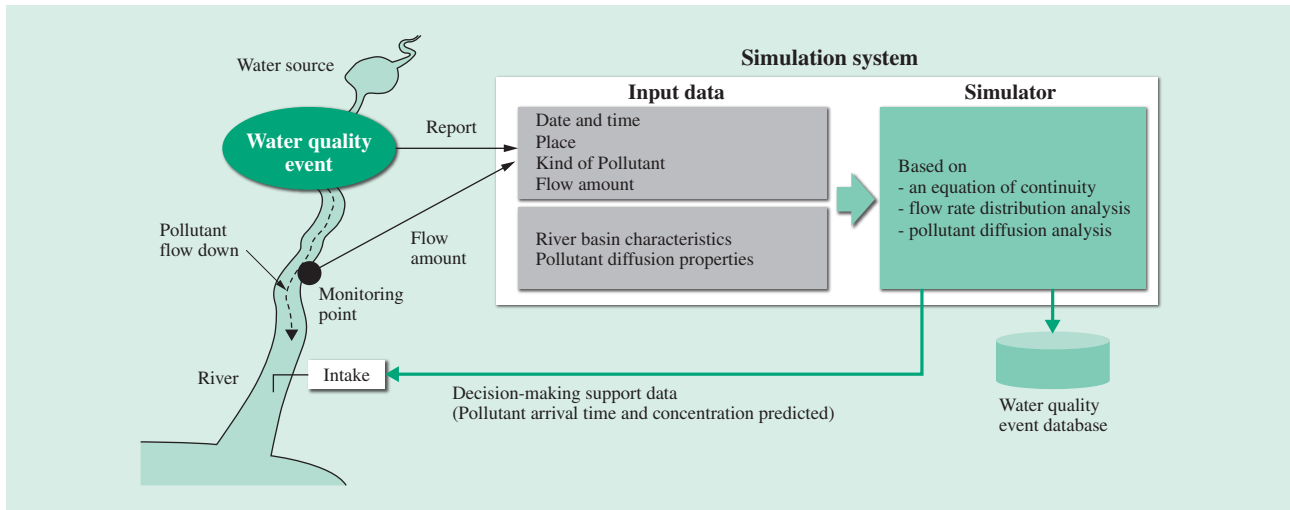


Fig. 1—Japanese Proposal to ISO/TC 224/WG 9.

An example of a water quality event detection system, this river flow simulation technique (a system for calculating the time taken for pollutants to flow downstream, and their concentrations) was presented as a concept not tied to specific products or regions.

## International Standardization of Processes for Detecting Water-related Events

WG 9 has been active since 2012, working on standardizing the detection of water-related events and the decision making process. Because Japan supplies sensors, monitoring and control systems, and other products that assist with the detection of water-related events, such as water pollution, and has experience with their use, it put forward these as examples of best practices.

Fig. 1 shows one such example submitted by Japan<sup>(4)</sup>. This is a river flow simulation technique (a system for calculating the time taken for pollutants to flow downstream, and their concentrations) that helps make decisions such as whether to halt the intake of water when a water quality event occurs upstream. While the system is already installed at water utilities in Japan, it was presented as a concept with global applicability that is not tied to specific product requirements or regions.

## Future Prospects

ISO/TC 224 has set up numerous WGs over the 14 years since its formation was first proposed. While the scope of activities to date has involved the formulation of service standards for voluntary adoption by water and sewage utilities, there has been debate on the subject of broadening this to include products and stakeholders. In the future, Hitachi intends to keep watching the unfolding developments and to continue its involvement through Japan's public-private collaboration.

## INTERNATIONAL STANDARDIZATION OF WATER RE-USE BY ISO/TC 282

### Background and Current Status of Standardization Activities

The ISO/TC 282 technical committee for water re-use established in June 2013 is chaired by Israel and has a dual secretariat from Japan and China. It provides a forum for formulating international standards on water re-use, with Japan taking a leading role. Recognizing this, a national coordinating body has been set up under the Director for Watershed Management at the Sewerage and Wastewater Management Department of the Ministry of Land, Infrastructure, Transport and Tourism. The first meeting of ISO/TC 282 was held in Tokyo in January 2014 and the second in Lisbon, Portugal in November 2014.

The first meeting was attended by 10 countries and dealt with establishing the organizational structure of the committee. In addition to approving the establishment of Sub-committee 1 (SC 1: Treated wastewater re-use for irrigation) coordinated by Israel, it also decided to hold votes on setting up Sub-committee 2 (SC 2: Water re-use in urban areas) proposed by China, and Sub-committee 3 (SC 3: Risk and performance evaluation of water re-use systems) proposed by Japan. A vote held in March 2014 approved the establishment of both of these sub-committees. Also at the first meeting, Israel proposed and gained approval for establishing a WG on "Treated Mine Water Use."

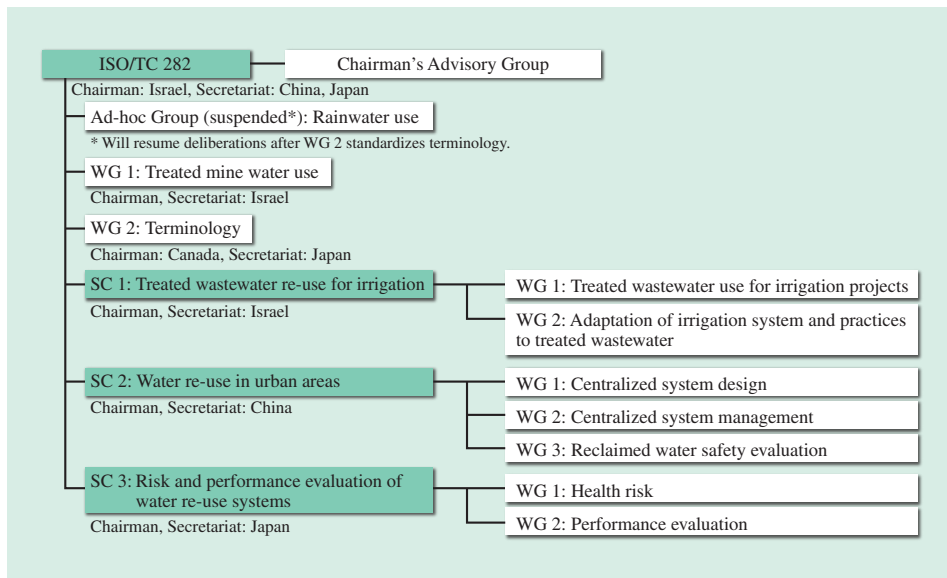


Fig. 2—Organizational Structure for Standards Development in ISO/TC 282 (Water Re-use) (as of September 1, 2015). The organization is made up of two WGs that report directly to the TC and three SCs. Japan plays a central role in WG 2 (Terminology) and SC 3 (Risk and performance evaluation of water re-use systems).

At the second meeting, Japan proposed the development of three guidelines on, (1) methods for assessing health risks, (2) grading of water for re-use, and (3) methods for assessing membrane bioreactor (MBR) technology. However, the second and third of these failed to gain approval. Following discussion among the participating nations, however, it was agreed to prioritize standards development for a revised version of the second proposal on water grading, and to undertake a comprehensive revision of the third proposal in the form of guidelines on “methods of assessing treatment techniques for water re-use.” The revised and new proposals were submitted in December and approved by a vote held in February 2015. Future work on standards development for these three Japanese proposals will be undertaken by SC 3.

Fig. 2 shows the organizational structure for standards development in ISO/TC 282 (as of September 1, 2015). WG 1, which was proposed by Israel, may in the future be replaced by a fourth sub-committee (SC 4) on industrial water re-use.

### International Standardization of Treatment Techniques for Water Re-use

In January 2014, the Water Reuse Promotion Center and Kyoto University were jointly contracted to undertake a three-year project on “establishing platforms for international standardization and wider adoption of water recycling systems” to provide tools for exports of water infrastructure, the request for which was issued by the Technical Regulations, Standards and Conformity Assessment Policy Division of the Ministry of Economy, Trade and Industry (METI). With the aim

of submitting standardization proposals to ISO/TC 282, this project involved preparing draft international standards for methods of assessing the performance of water re-use systems, as well as for membrane-, ultraviolet-, and ozone-based treatment techniques, and the collection of test data on the risk assessment of recycled water using the membrane bioreactor-reverse osmosis (MBR-RO) system of Water Plaza Kitakyushu.

To formulate guidelines on methods for assessing the performance of treatment techniques for water re-use, work is being undertaken in collaboration with the above METI international standardization project. A working draft (WD) was circulated among the participating nations in April 2015, and consultation among the national representatives has been underway since the WG 2 meeting of SC 3 held in Canada in May.

### Future Prospects

Because there is a limited market for water re-use in Japan, Japanese companies working in the field have been seeking to identify markets and establish operations overseas. Having their products and systems appropriately assessed in accordance with ISO standards helps differentiate them from competitors and should lead to a larger share of overseas markets.

Work on developing standards at the ISO/TC 282 technical committee has only just begun. The international standardization of methods for assessing the performance of technologies associated with water re-use can be expected to help improve the water environment around the world and to invigorate Japan’s water-related industries.

## INTERNATIONAL STANDARDIZATION OF SMART COMMUNITIES BY ISO/TC 268/SC 1

The over-concentration of populations in cities is giving rise to a variety of societal challenges around the world, particularly in emerging and developing economies. Given that the fundamental solution to these problems lies in the appropriate provision of social infrastructure, concepts such as the smart city and the environmentally conscious city have been put forward as ways of creating a new generation of cities in which this objective has been realized.

It was based on this background that the ISO/TC 268 technical committee was established in 2012 to work on sustainable development in communities. Japan is both the chair and secretary of the first sub-committee (SC 1: Smart community infrastructures), which is working on the standardization of PIs and frameworks for urban infrastructure<sup>(5)</sup>.

Definitions and yardsticks for assessing smart cities and livable communities have not always been clear in the past. Accordingly, ISO/TC 268/SC 1 has adopted a three-tier model of communities (shown in Fig. 3) that defines the scope of standardization in terms of urban infrastructure layers that include energy, water, mobility, and telecommunications. The sub-committee is looking not just at individual infrastructure systems, but also at examples of their interoperation. Its first publication was the ISO TR 37150 technical report, which deals with metrics for smart community infrastructures and was issued in 2014. Similarly, the ISO TS 37151 technical specification on the principles and requirements for performance metrics was issued in 2015<sup>(6)</sup>.

Water supply and sewage are part of the community infrastructure layer and need to interoperate with other forms of infrastructure such as energy and telecommunications. The work being done by ISO/TC 268/SC 1 is also being regularly reflected in other water-related standardization activities, including ISO/TC 224.

## CONCLUSIONS

International standardization in the water industry has been expanding to also encompass service standardization. Now, 14 years or so after ISO/TC 224 started its work, there is vigorous activity on standardization aimed at dealing with specific challenges such as asset management, crisis management, and reducing the load on the environment. This has spread

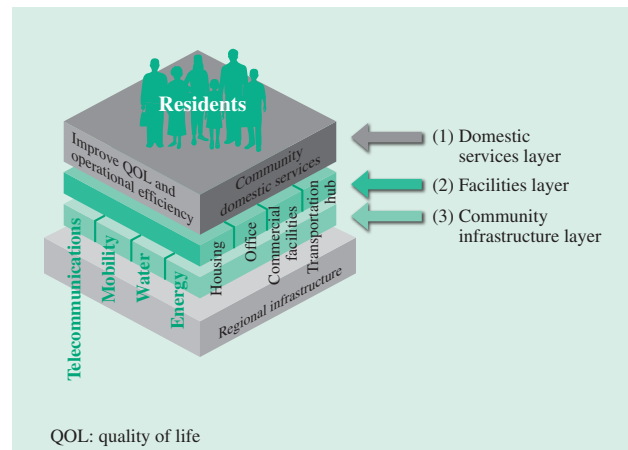


Fig. 3—Three-tier Structure of Communities. ISO/TC 268/SC 1 is looking at the functions of social infrastructure in communities in terms of a three-tier model. Water and sewage form part of the community infrastructure layer that underpins domestic services and facilities.

in recent times to cover users as well as service providers, including starting work on the international standardization of things like which products may be flushed down the drain and the efficient use of water.

It is important to recognize that, rather than the international standardization of technologies as such, work is progressing on the standardization of the business environment to ensure that technologies are used effectively. While this can be expected to open up or expand new markets, there will also likely be cases where reforms will be needed to existing business processes.

Hitachi is working to offer solutions for water and the environment that seek to overcome challenges through the extensive integration of products, systems, and services for the water industry. In addition to incorporating developments in service standardization into these activities, Hitachi also aims to use its work on international standardization through public-private collaborations to help overcome water-related challenges throughout the world.

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