

**Water and Sanitation Standards in Southeast Asia  
A Guide for U.S. Manufacturers and Exporters**

**Created by the  
International Association of Plumbing and Mechanical Officials (IAPMO)**

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## Acknowledgements

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### Disclaimer

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## EXECUTIVE SUMMARY

### OBJECTIVES

There is a growing global water crisis that threatens economic growth, public health, and national security, and generally reduces the capacity of countries to advance important national priorities. Public and private stakeholders in the United States have an important role to play in addressing these challenges, providing technologies and policy solutions that will contribute to a healthier, safer, more water-secure world where people have sustainable supplies of water of sufficient quantity and quality.

To better understand the opportunities and barriers that U.S. public and private stakeholders face, IAPMO undertook a review of technical requirements in several ASEAN member economies. The vision of this work was guided by two interconnected strategic priorities:

- Provide guidance to international manufacturers and U.S. exporters to better understand the current standards and conformity assessment landscape for plumbing, water efficiency, and water quality standards within the priority markets;
- Identify opportunities and barriers to trade and industry development for potential collaboration between public and private stakeholders operating in the region.

This study was developed for the purpose of understanding how ASEAN member economies utilize internationally recognized standards in the development of their water and sanitation systems, aligning critical infrastructure objectives with trade considerations. Plumbing codes and related technical regulations are important policy tools for managing the safety, security, health, environment and economy of this critical aspect of the building sector. They are also regulatory tools for helping economies adapt to water stresses, protect water quality and improve energy efficiency. Plumbing standards also provide policymakers with an important tool to promote sustainability, encourage economic growth, and develop smart cities.

This study is focused on plumbing-related regulations in Indonesia, the Philippines and Vietnam. These countries were selected because of IAPMO's historical involvement in each country and as a representative sample of the other seven ASEAN countries. As part of its review, IAPMO examined several key elements for each country:

- *Industry-developed international standards that are referenced in each country's plumbing installation code of practice*
- *Technical regulations on plumbing fittings/fixtures, piping, and water treatment technologies*
- *Mandatory and voluntary certification requirements*

It is recognized that the data included in this study is a snapshot of an ever-changing landscape. It is also limited to the input of important industry stakeholders who made every effort to provide a comprehensive review of technical requirements. IAPMO's intent is that this research become the foundation for future development and actions.

### KEY FINDINGS

In its review of the data gathered as part of this effort, IAPMO identified several key findings that are summarized below. These findings also include areas of potential collaboration between industry and policymakers in ASEAN economies.

- ASEAN represents an enormous market opportunity for the plumbing industry with a growing middle class, increasing disposable incomes and a continuing focus on infrastructure.
- ASEAN is at a critical stage in the development of its regulatory frameworks for water and sanitation systems. Today, there is an opportunity to shape and align market access requirements across the region and with the U.S. before regulations and conformity assessment requirements become too firmly entrenched in this sector.
- Similarly, without coordinated action there exists a risk of fragmentation among ASEAN markets, increasing the potential costs and technical barriers faced by exporters.
- Plumbing is central to the provision of water and sanitation services. However, inefficient and unsafe products crowd the marketplaces. Growth of the plumbing industry and trade in this region are hampered by:
  - Incomplete, out-of-date, or misaligned technical regulations
  - Lack of voluntary or mandatory certification schemes
- Recognition of international conformity assessment bodies, as well as further development and alignment of mandatory certification schemes, will help increase the competitiveness of quality products, including U.S. exports.
- National sustainability and disaster resiliency goals, as well as initiatives to promote smart cities in this region, are hindered by lack of regulation and enforcement of plumbing systems.
- Water efficiency requirements have rarely been adopted and enforced, despite growing populations, increased urbanization, and rising water stresses across the region.
- Ensuring water quality is a challenge throughout the region. In the built environment, these efforts are hampered by 1) insufficient technical regulations on water system components; and 2) limited regulatory requirements for water treatment technologies (e.g., point-of-use/point-of-entry systems).
- Progress has been made in aligning market access requirements in the region. Successful initiatives in this area have been industry-led and have greatly benefited from partnerships with U.S. government agencies and ministries in ASEAN member economies. More collaboration between public and private stakeholders will be essential to continuing to grow trade, remove technical barriers, and increase opportunities for international manufacturers and U.S. exporters.

## Water and Sanitation Standards in Southeast Asia – A Guide for U.S. Stakeholders

Access to improved drinking water and sanitation is one of the most fundamental issues facing the global community. The COVID pandemic and resulting health crisis underscore the fundamental role water and sanitation play in public health and economic development. Approximately 2.5 billion people worldwide do not have access to improved sanitation and 768 million people rely on unimproved drinking-water sources. By 2025, two-thirds of the world’s population will be living in severely water-stressed areas.

The challenges surrounding improving access to water and sanitation services are systemic. Many countries face hurdles related to poor governance, inadequate infrastructure and supply chains, poor system maintenance, skilled worker shortages, and transforming cultural or social norms related to sanitation. These challenges are further compounded by the continuing urbanization and growth of the world’s population, which is projected to add 2.5 billion people to the urban population by 2050.

ASEAN countries are not exempt from these global trends. In a recent environmental sustainability index that examined 97 different markets, Indonesia and the Philippines rank in the bottom quartile of countries on equity issues (access to improved water and sanitation) and water efficiency and productivity, with Vietnam faring somewhat better.<sup>1</sup> Collectively, these hurdles represent an opportunity for U.S. exporters of environmental technologies and serve to underscore the barriers that must be overcome to ensure U.S. goods are competitive.

Water is also an opportunity that extends beyond trade and economic growth. As noted in the U.S. Global Water Strategy, “water is an entry point to advance core democratic values around equality, transparency, accountability, women’s empowerment and community organization.... In other words, water can be a means of strengthening governance, civil society engagement and resilience at all levels.”

The plumbing sector in the United States has benefited directly from engaging on international water issues. U.S. technologies, expertise, and best practices are in high demand, which presents an opportunity for U.S. manufacturers and exporters. The global water and wastewater market currently exceeds \$700 billion annually and is growing. Demonstrating U.S. approaches and technologies globally has been proved to increase U.S. exports and jobs.<sup>2</sup>

This guide is designed to identify important regulatory and enforcement requirements, helping exporters understand and guide their operations in the region. It can also help national governments create enabling environments that will improve drinking water and sanitation service delivery, enhance water sector coordination, and mobilize investment. This, in turn, will help ASEAN countries meet critical infrastructure and climatic goals in the region while paving the way for increased U.S. exports of environmental-related technologies and services for decades to come.

### ABOUT IAPMO

The International Association of Plumbing and Mechanical Officials (IAPMO) is a nearly 100-year-old trade association that focuses its comprehensive services on the technical aspects of the plumbing and

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<sup>1</sup> Euromonitor, *International’s Environmental Sustainability Index*, June 2019.

<sup>2</sup> USAID, *U.S. Government Global Water Strategy*, 2017.

mechanical industries. The organization is comprised of 13 different business units with offices and staff in 11 countries. Its membership includes trained labor and contractors, engineers, product manufacturers, suppliers, plumbing and mechanical inspectors, and building officials. As a global leader, IAPMO has assisted with the development of standards, skills training, and conformity assessment services in regions around the world. IAPMO also works closely with international aid organizations in developing nations to create enabling environments for water and sanitation services to spread and local industries to grow.

This research was carried out by IAPMO during the summer of 2021 with support from the International Trade Administration at the U.S. Department of Commerce. IAPMO’s partnership with officials from the U.S. Department of Commerce has been fruitful. In September 2018, IAPMO entered into a strategic partnership with the U.S. Department of Commerce’s International Trade Administration to increase U.S. plumbing exports to Southeast Asia by increasing adoption and use in that region of standards and conformity assessment methods commonly used by U.S. companies. In May 2019, IAPMO received the President’s “E” Award. This distinguished honor celebrated the impact IAPMO’s work has had in building local industries, economies and trade in developing countries.

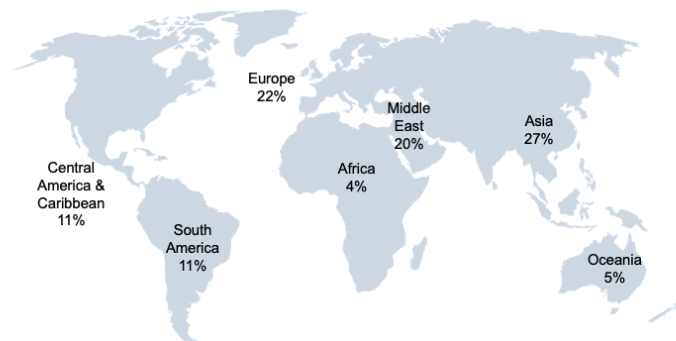
### U.S. EXPORTS TO ASEAN

The global plumbing fixtures market size was valued at \$75 billion in 2016 and is projected to reach \$1.12 trillion by 2023, growing at a CAGR of 6.0% from 2017 to 2023. A rise in construction in Asian-Pacific countries is expected to drive market growth. Additionally, the introduction of various new systems, including water-efficient and water-reuse systems, is expected to create lucrative opportunities in the plumbing fixtures market.

The plumbing sector in the United States is a \$112 billion industry that employs more than 500,000 people through more than 120,000 businesses. U.S. plumbing manufacturers export to 198 markets to help satisfy the growing global demand. The plumbing fixture and fittings industry contributes \$85.5 billion to the American economy — about four-tenths of 1% of America’s gross domestic product. These manufacturers, along with their wholesale and retail partners, generate more than \$34 billion in direct annual output, providing more than 193,000 jobs and in excess of \$10 billion in wages. Furthermore, the industry supports more than 271,300 jobs through its supplier and induced impacts, with a payroll exceeding \$15.5 billion. Increasing U.S. plumbing exports is critical to the future growth of this sector.

Southeast Asia represents an important region for the U.S. plumbing industry. Outside of North America, the region is the largest beneficiary of U.S. plumbing exports. Indonesia is the fourth-most populous country in the world and the Philippines is not far behind at 13<sup>th</sup>. With a rising middle class with more disposable income, compounded with major infrastructure investments, Southeast Asia represents the most

U.S. Plumbing Exports Outside of North America



important long-term growth opportunity for the plumbing industry. ITA recognizes this in its reporting, finding that:

*While more advanced countries have established plumbing infrastructure and present near-term opportunities, the lower level of plumbing infrastructure in less developed countries presents an opportunity for the U.S. in the longer-term.<sup>3</sup>*

ITA also recognizes how organizations like IAPMO create export opportunities in countries that are still developing their water and plumbing infrastructure, stating:

*Collaboration between U.S.-based plumbing code and standards developers and relevant authorities in developing countries can create an opportunity for information and resource*

## **OVERVIEW OF RESEARCH**

This study focused on plumbing-related regulations in Indonesia, the Philippines and Vietnam. These countries were selected because of IAPMO's historical involvement in each country and as a representative sample of the other seven ASEAN countries. The research was conducted during the summer of 2021 with input solicited from domestic and international plumbing stakeholders. These stakeholders included standards developing associations (SDOs), manufacturers, conformity assessment bodies, and regulators.

As part of its review, IAPMO examined several key elements for each country:

- *Industry-developed international standards that are referenced in each country's plumbing installation code of practice*
- *Technical regulations on plumbing fittings/fixtures, piping, and water treatment technologies*
- *Mandatory and voluntary certification requirements*

This research was divided into two phases. In the first phase, IAPMO did a careful review of international standards referenced in each of the country's national plumbing codes. In particular, IAPMO identified standards developed by ASME, ASTM International, IAPMO, NSF International and the Water Quality Association (WQA). In the second phase, IAPMO carried out a review of national technical regulations. It explored whether use of the national standards was mandatory or voluntary. It also identified whether these standards fell under mandatory and/or voluntary certification or national quality mark schemes. For this research effort, these certification schemes were defined as follows.

- **Mandatory certification scheme:** a process required by the authority with jurisdiction to verify product compliance to an international standard, national technical regulation or other requirement. It frequently involves independent third-party verifiers who certify the applying companies can prove that their products or processes meet the specified requirements. In ASEAN, piping and toilets are the products most likely to fall under mandatory certification schemes. Mandatory certification schemes create an enforceable barrier and are essential to establishing the minimum safety and performance requirements for products being sold in a market. Without these requirements in the water and sanitation sector, markets are frequently saturated with products of questionable efficiency and safety.

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<sup>3</sup> US Department of Commerce, *2016 Top Markets Report: Building Products and Sustainable Construction*. May 2016.

- Voluntary certification scheme: a process for voluntarily validating conformity to requirements of national standards, technical specifications, or other requirements. In the water and sanitation sector, these schemes can be helpful to the construction industry and consumers to identify varying levels of efficient products or can be used to denote simple compliance to a non-required specific technical regulation.

IAPMO’s efforts in this second phase largely focused on three distinct categories: plumbing fittings and fixtures, piping, and water treatment technologies. Detailed data tables have been provided in this report on the findings from both research phases.

The data in this report was largely collected by international stakeholders, and this is a snapshot in an ever-evolving regulatory landscape. To the extent possible, IAPMO made a good-faith effort to independently verify the data presented. IAPMO also recognizes that this is the first time a detailed examination of the regulatory landscape of the plumbing industry in Asia has been developed. IAPMO hopes that this will become the foundation for continued development so that public and private resources can be efficiently applied to maximize the import/export of plumbing goods.

## **IAPMO HISTORICAL ENGAGEMENT IN ASEAN**

Over the past 20 years, IAPMO has helped lead one of the most significant efforts to align plumbing construction practices and product standards across the ASEAN region. This initiative was largely focused on assisting the governments of Indonesia, the Philippines and Vietnam to develop their own National Plumbing Code (NPC) based off of IAPMO’s *Uniform Plumbing Code*. Each plumbing code contains the basic requirements for plumbing design and installation. It also references hundreds of internationally recognized plumbing standards.

### Indonesia

Thanks to a successful partnership between IAPMO and the U.S. Department of Commerce through the Water for Indonesia Now MDCP project, Indonesia adopted its first Indonesian National Standard for plumbing — SNI 8153:2015, Plumbing Systems for Buildings. Per the objectives of the project, IAPMO successfully worked with Indonesia’s national standards body (BSN) to ensure that key U.S.-developed plumbing product standards were referenced in the new code of installation practices. Through this effort, IAPMO also opened a new plumbing product testing and certification laboratory in Indonesia — a key industry milestone. Additionally, important partnerships were established with universities and government ministries who oversee the credentialing of a skilled workforce. SNI 8153:2015 has been mandated by the Ministry of Public Works and Housing for the purpose of constructing any new government building. The ministry also encourages the private sector to utilize it.

### Philippines

Since 2000, IAPMO has partnered with the Philippine Society of Environmental and Sanitary Engineers, formerly Philippine Society of Sanitary Engineers (PSENSE). This partnership has culminated in the development of the *Uniform Plumbing Code – Philippines*. It also is the foundation for *the National Plumbing Code – Philippines*, which is a part of the *National Building Code of the Philippines* and is required in the construction of all buildings.



## Vietnam

In 1997, IAPMO provided the Institute of Building Science & Technology with financial and technical resources to utilize an international standard (the *Uniform Plumbing Code*) as the foundation for the *Vietnam Plumbing Code*. The project was successfully completed, and the code was officially adopted in 1999 and remains in effect today.

While these national plumbing codes are based on international codes and standards, the construction practices required in each of these codes have been tailored to suit local needs. The new codes provide the necessary framework for how plumbing systems can effectively be developed and provides local regulators with the ability to enforce these practices. These plumbing codes continue to play an important role in helping to establish a healthy and robust plumbing sector in each country. They also have helped lay the foundation that will ultimately ensure the competitiveness of U.S. plumbing exporters, who are working to increase their presence in this large market.

## PRODUCT TECHNICAL STANDARDS

IAPMO examined the references to industry-created international standards in SNI 8153:2015 (Indonesia), the *National Plumbing Code of the Philippines*, and the *Plumbing Code of Vietnam*. For reference, IAPMO also included standards referenced in the 2021 edition of *Uniform Plumbing Code*. As noted above, the *Uniform Plumbing Code* forms the foundation for national plumbing codes used in Indonesia, the Philippines, Vietnam, and the United States. It represents one of the most significant efforts to harmonize water and sanitation across the region and with the United States. IAPMO limited its review of referenced standards to those created by ASME (Table 1.1), ASTM International (Table 1.2), IAPMO (Table 1.4), NSF International and the Water Quality Association (Table 1.5).

In total, 458 references to these industry-developed international standards were identified across the four NPCs. IAPMO identified 199 references to industry-created international standards in SNI 8153, 135 references in the *National Plumbing Code of the Philippines*, and 213 references in the *Plumbing Code of Vietnam*. By comparison, the 2021 version of the *Uniform Plumbing Code* references 255 similar standards. The data found the following number of standard references were shared across the four countries:

	4 Countries	3 Countries	2 Countries	1 Country
Number of shared references to international standards	38	53	124	244

As public and private stakeholders target potential areas for harmonization on plumbing standards in ASEAN, the data included in the following tables highlight areas where alignment has occurred and which standards should be pursued further.

**Table 1.1 ASME Standards Referenced in ASEAN National Plumbing Codes**

Uniform Plumbing Code USA - 2021	SNI 8153 Indonesia - 2015	National Plumbing Code Philippines - 2000	Plumbing Code Vietnam - 1999
			ASME A13.1-1981
		ASME A40.5	
ASME A112.1.2-2012 (R2017)	ASME A112.1.2-2004		ASME A112.1.2-1991
ASME A112.1.3-2000 (R2015)	ASME A112.1.3-2000 (R2010)		
ASME A112.3.1-2007 (R2017)	ASME A112.3.1-2007		
ASME A112.3.4-2018	ASME A112.3.4-2000 (R2004)		
ASME A112.4.1-2009 (R2014)	ASME A112.4.1-2009		ASME 112.4.1-1993

ASME A112.4.2-2015	ASME A112.4.2-2009		
	ASME A112.4.3-1999 (R2010)		
ASME A112.4.4-2017			
ASME A112.4.14-2017			
ASME A112.6.1M-1997 (R2017)	ASME A112.6.1M-1997 (R2007)		ASME A112.6.1M-1988
ASME A112.6.2-2017	ASME A112.6.2-2000 (R2010)		
ASME A112.6.3-2016	ASME A112.6.3-2001		
ASME A112.6.4-2003 (R2012)	ASME A112.6.4-2004 (R2008)		
ASME A112.6.7-2010 (R2015)	ASME A112.6.7-2010		
ASME A112.6.9-2005 (R2015)	ASME A112.6.9-2005 (R2010)		
ASME A112.14.1-2003 (R2017)	ASME A112.14.1-2003 (R2008)	ASME A112.14.1	ASME A112.14.1-1975
ASME A112.14.3-2018	ASME A112.14.3-2000 (R2004)		
ASME A112.14.4-2001 (R2017)	ASME A112.14.4-2001 (R2007)		
ASME A112.14.6-2010 (R2015)	ASME A112.14.6-2010		
			ASME A112.16.23-1992
			ASME A112.16.29-1986
ASME A112.18.1-2018	ASME A112.18.1-2005	ASME A112.18.1M	ASME A112.18.1M-1994
ASME A112.18.2-2015	ASME A112.18.2-2005		
ASME A112.18.3-2002 (R2017)			
ASME A112.18.6-2017	ASME A112.18.6-2009		
ASME A112.18.9-2011 (R2017)	ASME A112.18.9-2011		
		ASME A112.19M	
ASME A112.19.1-2018	ASME A112.19.1-2008	ASME A112.19.1M	ASME A112.19.1M-1987
ASME A112.19.2-2018	ASME A112.19.2-2008		ASME A112.19.2M-1995
ASME A112.19.3-2017	ASME A112.19.3-2008	ASME A112.19.3	ASME A112.19.3M-1987
		ASME A112.19.4M	ASME A112.19.4M-1995
ASME A112.19.5-2017	ASME A112.19.5-2005	ASME A112.19.5	ASME A112.19.5-1979
			ASME A112.19.6-1990
ASME A112.19.7-2012 (R2017)	ASME A112.19.7-2006	ASME A112.19.7	ASME A112.19.7M-1995
		ASME A112.19.8	ASME A112.19.8M-1987
			ASME A112.19.9M-1991
ASME A112.19.12-2014	ASME A112.19.12-2006 (R2011)		
ASME A112.19.14-2013 (R2018)	ASME A112.19.14-2006 (R2011)		
ASME A112.19.15-2012 (R2017)	ASME A112.19.15-2005 (R2010)		
ASME A112.19.19-2016	ASME A112.19.19-2006 (R2011)		
			ASME A112.21.1M-1991
			ASME A112.21.2M-1983
			ASME A112.26.1m-1984
	ASME A112.21.3M-1985 (R2007)	ASME A112.21.2M	
ASME A112.36.2M-1991 (R2017)	ASME A112.36.2M-1991 (R2008)	ASME A112.36.2	ASME A112.36.2M-1991
			ASME A118.10-1993
			ASME B1.10.1-1983
ASME B1.20.1-2013		ASME B1.20.1	
			ASME B1.20.3-1991
			ASME B2.1-1990
ASME B16.1-2015			ASME B16.1-1989
ASME B16.3-2016		ASME B16.3	ASME B16.3-1992
ASME B16.4-2016			
ASME B16.5-2017			ASME B16.5-1988
ASME B16.12-2009 (R2014)		ASME B16.12	ASME B16.12-1991
ASME B16.15-2018		ASME B16.15	
ASME B16.18-2018		ASME B16.18	
ASME B16.20-2017			
ASME B16.21-2016			
ASME B16.22-2018	ASME B16.22-2001 (R2010)	ASME B16.22	
ASME B16.23-2016		ASME B16.23	ASME B16.23-1992
ASME B16.24-2016		ASME B16.24	ASME B16.24-1991
ASME B16.26-2018		ASME B16.26	ASME B16.26-1988
ASME B16.29-2017		ASME B16.29	ASME B16.29-1986
			ASME B16.32-1992
ASME B16.34-2017			ASME B16.34-1988
			ASME B16.39-1986

ASME B16.42-2016			
ASME B16.47-2017			ASME B16.47-1990
ASME B16.50-2018			
ASME B16.51-2018			
ASME B31.3-2016			
ASME B36.10M-2018			ASME B36.10-1985
		ASME D16.4	
ASME BPVC Section VIII.1-2017			
ASME BPVC Section IX-2017			

**Table 1.2 ASTM Standards Referenced in ASEAN National Plumbing Codes**

<b>Uniform Plumbing Code USA - 2021</b>	<b>SNI 8153 Indonesia - 2015</b>	<b>National Plumbing Code Philippines - 2000</b>	<b>Plumbing Code Vietnam - 1999</b>
ASTM A53/A53M-2018	ASTM A 53/A 53M-2010	ASTM A 53	ASTM A 53-1993a
ASTM A74-2017	ASTM A 74-2009	ASTM A 74	ASTM A 74-1993
		ASTM A 126	
ASTM A106/A106M-2018			
		ASTM A 120	ASTM A 120-1984 (D)
			ASTM A 126-1993
			ASTM A 197-1987 (R-92)
ASTM A254/A254M-2012			
ASTM A268/A268M-2010 (R2016)			
ASTM A269/A269M-2015a			
ASTM A312/A312M-2018a			
		ASTM A 377	ASTM A 377-1989
ASTM A403/A403M-2018a			
		ASTM A 525	ASTM A 525-1993
ASTM A554-2016			
		ASTM A 733	
ASTM A778-2016			
ASTM A861-2004 (R2017)			
ASTM A888-2018a	ASTM A 888-2009	ASTM A 888	
	ASTM A 1045-2008		
ASTM A1056-2012 (R2017)	ASTM A 1056-2008		
			ASTM B 29-1992
ASTM B32-2008 (R2014)	ASTM B 32-2008	ASTM B 32	ASTM B 32-1995a (4)
ASTM B42-2015a	ASTM B 42-2010	ASTM B 42	ASTM B 42-1993
ASTM B43-2015	ASTM B 43-2009	ASTM B 43	ASTM B 43-1994
			ASTM A 74-1993 (1)
ASTM B75/B75M-2011		ASTM B 75	ASTM B 75-1993
ASTM B88-2016	ASTM B 88-2009	ASTM B 88	ASTM B 88-1993a
ASTM B135/B135M-2017	ASTM B 135-2010	ASTM B 135	ASTM B 135-1991
ASTM B152/B152M-2013		ASTM B 152	ASTM B 152-1994
ASTM B210-2012			
ASTM B241/B241M-2016			
ASTM B251/B251M-2017		ASTM B 251	ASTM B 251-1993
ASTM B280-2018			ASTM B 280-1993a
		ASTM C 296	
ASTM B302-2017		ASTM B 302	ASTM B 302-1992
ASTM B306-2013		ASTM B 306	ASTM B 306-1992
			ASTM B 370-1992
		ASTM C 428	
ASTM B447-2012a		ASTM B 447	ASTM B 447-1993
		ASTM B 584	ASTM B 584-1993b(5)
		ASTM B 587	
		ASTM B 687	
		ASTM B 641	
		ASTM B 642	
		ASTM B 716	
ASTM B813-2016	ASTM B 813-2010		
ASTM B819-2018			

ASTM B828-2016			
ASTM C4-2004 (R2018)			
		ASTM C 14	ASTM C 14-1992
		ASTM C 412	
ASTM C425-2004 (R2018)		ASTM C 425	ASTM C 425-1990a
		ASTM C 443	
ASTM C564-2014	ASTM C 564-2009a	ASTM C 564	ASTM C 564-1995a
ASTM C700-2018	ASTM C 700-2011	ASTM C 700	ASTM C 700-1991
	ASTM C 966-1998 (R2008)		
ASTM C1053-2000 (R2015)	ASTM C 1053-2000 (R2010)	ASTM C 1053	
ASTM C1173-2018	ASTM C 1173-2010		ASTM C 1173-1995
	ASTM C 1227-2009		
ASTM C1277-2018	ASTM C 1277-2009a		ASTM C 1277-1994
	ASTM C 1440-2008		
ASTM C1460-2017	ASTM C 1460-2008		
ASTM C1461-2008 (R2017)	ASTM C 1461-2008		
ASTM C1540-2018	ASTM C 1540-2009a		
ASTM C1563-2008 (R2017)			
ASTM C1822-2015			
	ASTM D 1527-1999 (R2005)		ASTM D 1527-1989
	ASTM D 1784-2008		
ASTM D1785-2015e1	ASTM D 1785-2006	ASTM D 1785	ASTM D 1785-1993
		ASTM D 1869	
			ASTM D 2104-1993
ASTM D2235-2004 (R2016)	ASTM D 2235-2004 (R2011)		
ASTM D2239-2012a		ASTM D 2239	
ASTM D2241-2015	ASTM D 2241-2009	ASTM D 2241	ASTM D 2241-1993
			ASTM D 2282-1989
			ASTM D 2321-1989
ASTM D2464-2015		ASTM D 2464	ASTM D 2464-1994(1)
ASTM D2466-2017	ASTM D 2466-2006	ASTM D 2466	ASTM D 2466-1994(1)
ASTM D2467-2015	ASTM D 2467-2006	ASTM D 2467	ASTM D 2467-1994(1)
ASTM D2513-2018a		ASTM D 2235	ASTM D 2235-1993a
			ASTM D 2239-1993
			ASTM D 2468-1993
			ASTM D 2465-1973 (D)
			ASTM D 2469-1976 (D)
ASTM D2564-2012 (R2018)	ASTM D 2564-2004 (R2009)	ASTM D 2564	ASTM D 2564-1993
ASTM D2609-2015		ASTM D 2609	
ASTM D2661-2014e1	ASTM D 2661-2008	ASTM D 2661	ASTM D 2661-1994a(1)
		ASTM D 2662	
ASTM D2665-2014	ASTM D 2665-2010		ASTM D 2665-1994
		ASTM D 2666	
		ASTM D 2672	ASTM D 2672-1994
ASTM D2680-2001 (R2014)			ASTM D 2680-1993
ASTM D2683-2014			
ASTM D2729-2017	ASTM D 2729-2011	ASTM D 2729	ASTM D 2729-1993 (1)
ASTM D2737-2012a	ASTM D 2737-2003		ASTM D 2737-1993
			ASTM D 2740-1989E1(D)
	ASTM D 2751-2005	ASTM D 2751	ASTM D 2751-1993
	ASTM D 2774-2010		
ASTM D2846/D2846M-2019	ASTM D 2846-2009b	ASTM D 2846	ASTM D 2846-1993
			ASTM D 2855-1993
			ASTM D 2996-1988
			ASTM D 3000-1993
			ASTM D 3033-1985(D)
ASTM D3034-2016	ASTM D 3034-2008	ASTM D 3034	ASTM D 3034-1994
ASTM D3035-2015	ASTM D 3035-2010		
			ASTM D 3036-1973(D)
	ASTM D 3122-1995 (R2009)		
ASTM D3138-2004 (R2016)	ASTM D 3138-2004 (R2011)		
ASTM D3139-1998 (R2011)			ASTM D 3139-1989

ASTM D3212-2007 (R2013)			ASTM D 3212-1992
ASTM D3261-2016			
		ASTM D 3309	
		ASTM D 3311	ASTM D 3311-1992
ASTM D4068-2017	ASTM D 4068-2009	ASTM D 4068	
	ASTM D 4101-2010a		
ASTM D4551-2017	ASTM D 4551-1996 (R2008)	ASTM D 4551	
ASTM E84-2018b			
ASTM E119-2018ce1			
ASTM E814-2013a (R2017)			
		ASTM F 402-1993	ASTM F 402-1993
	ASTM F 405-2005		
ASTM F409-2017	ASTM F 409-2002 (R2008)	ASTM F 409	ASTM F 409-1993
ASTM F437-2015	ASTM F 437-2009		ASTM F 437-1993
ASTM F438-2017	ASTM F 438-2009	ASTM F 438	ASTM F 438-1993
ASTM F439-2013	ASTM F 439-2009	ASTM F 439	ASTM F 439-1993a
ASTM F441/F441M-2015	ASTM F 441-2009	ASTM F 441	ASTM F 441-1994
ASTM F442/F442M-2013e1	ASTM F 442-2009		ASTM F 442-1993
			ASTM F 443-1977e1(D)
	ASTM F 446-1985 (R2009)		
	ASTM F 480-2006be1		ASTM F 480-1991
ASTM F493-2014	ASTM F 493-2010	ASTM F 493	
ASTM F628-2012e3	ASTM F 628-2008	ASTM F 628	ASTM F 628-1993
ASTM F656-2015	ASTM F 656-2010	ASTM F 656	ASTM F 656-1993
ASTM F667/F667M-2016	ASTM F 667-2006		
ASTM F714-2013			
		ASTM F 789	ASTM F 789-1989
ASTM F794-2003 (R2014)			
		ASTM F 810	ASTM F 810-1993
		ASTM F 845	
ASTM F876-2017			ASTM F 876-1993
ASTM F877-2018a			ASTM F 877-1993
ASTM F891-2016		ASTM F 891	ASTM F 891-1993a
ASTM F894-2013			
		ASTM F 949	ASTM F 949-1993a
ASTM F1055-2016a			
ASTM F1216-2016	ASTM F 1216-2009		
ASTM F1281-2017	ASTM F 1281-2007		
ASTM F1282-2017	ASTM F 1282-2010		
ASTM F1336-2015			
ASTM F1412-2016	ASTM F 1412-2009		
ASTM F1488-2014 (R2019)	ASTM F 1488-2009e1		
ASTM F1673-2010 (R2016)	ASTM F 1673-2010		
	ASTM F 1743-2008		
ASTM F1760-2016			
ASTM F1807-2018a	ASTM F 1807-2010e1		
ASTM F1866-2018	ASTM F 1866-2007		
ASTM F1960-2018a			
ASTM F1970-2012e1	ASTM F 1970-2005		
ASTM F1973-2013 (R2018)			
ASTM F1974-2009 (R2015)			
ASTM F1986-2001 (R2011)			
ASTM F2080-2018			
ASTM F2098-2015			
ASTM F2159-2018a	ASTM F 2159-2010		
	ASTM F 2306-2008		
ASTM F2389-2017a	ASTM F 2389-2010		
ASTM F2434-2018			
ASTM F2509-2015			
ASTM F2561-2017			
ASTM F2599-2016			
ASTM F2618-2015			

ASTM F2620-2013			
ASTM F2735-2018			
ASTM F2769-2018			
ASTM F2831-2012 (R2017)			
ASTM F2855-2012			
ASTM F2945-2018			
ASTM F3226/F3226M-2016e1			
ASTM F3240-2017			

**Table 1.3 IAPMO Standards Referenced in ASEAN National Plumbing Codes**

<b>Uniform Plumbing Code USA - 2021</b>	<b>SNI 8153 Indonesia - 2015</b>	<b>National Plumbing Code Philippines - 2000</b>	<b>Plumbing Code Vietnam - 1999</b>
ASSE 1001-2017	ASSE 1001-2008	ASSE 1001	ASSE 1001-1990
ASSE 1002	ASSE 1002-2008	ASSE 1002	
ASSE 1003-2009	ASSE 1003-2009	ASSE 1003	ASSE 1003-1995
ASSE 1004-2017			ASSE 1004-1990
			ASSE 1006-1989
			ASSE 1007-1992
ASSE 1008-2006	ASSE 1008-2006		ASSE 1008-1989
			ASSE 1009-1990
ASSE 1010-2004	ASSE 1010-2004		ASSE 1010-1982
ASSE 1011-2017	ASSE 1011-2004	ASSE 1011	ASSE 1011-1995
ASSE 1012-2009	ASSE 1012-2009		
ASSE 1013-2011	ASSE 1013-2009		ASSE 1013-1993
ASSE 1014-2005	ASSE 1014-2005	ASSE 1014	ASSE 1014-1990
ASSE 1015-2011	ASSE 1015-2009		ASSE 1015-1993
ASSE 1016-2017	ASSE 1016-2005	ASSE 1016	ASSE 1016-1990
	ASSE 1017-2009	ASSE 1017	ASSE 1017-1986
ASSE 1018-2001	ASSE 1018-2001	ASSE 1018	ASSE 1018-1986
ASSE 1019-2011 (R2016)		ASSE 1019	ASSE 1019-1995
ASSE 1020-2004	ASSE 1020-2004	ASSE 1020	
	ASSE 1021-2001		
ASSE 1022-2017	ASSE 1022-2003		ASSE 1022-1986
ASSE 1023-1979	ASSE 1023-1979		ASSE 1023-1979
ASSE 1024-2017			
		ASSE 1025	ASSE 1025-1978
			ASSE 1028-1981
			ASSE 1032-1980
			ASSE 1034-1981
ASSE 1035-2008	ASSE 1035-2008	ASSE 1035	ASSE 1035-1995
ASSE 1037-2015	ASSE 1037-1990		ASSE 1037-1990
ASSE 1044-2015	ASSE 1044-2001	ASSE 1044	
ASSE 1047-2011	ASSE 1047-2009		
ASSE 1048-2011	ASSE 1048-2009		
ASSE 1052-2016			ASSE 1052-1993
ASSE 1053-2004			
ASSE 1055-2018	ASSE 1055-2009		
ASSE 1056-2013	ASSE 1056-2001		ASSE 1056-1995
ASSE 1057-2012			
ASSE 1060-2017			
ASSE 1061-2015	ASSE 1061-2006		
ASSE 1062-2017	ASSE 1062-2006		
ASSE 1064-2006 (R2011)			
	ASSE 1066-1997		
ASSE 1069-2005	ASSE 1069-2005		
ASSE 1070-2015	ASSE 1070-2004		
ASSE 1071-2012	ASSE 1071-2008		
ASSE 1079-2012	ASSE 1079-2005		
ASSE 1081-2014			
ASSE 1084-2018			

ASSE 1085-2018			
ASSE 1087-2018			
ASSE Series 5000-2015			
ASSE Series 6000-2015			
ASSE 6020-2015			
ASSE 6030-2015			
ASSE 6035-2015			
ASSE Series 7000-2013			
ASSE/IAPMO 12010-2018			
ASSE/IAPMO 12030-2018			
ASSE/IAPMO 12040-2018			
IAPMO IGC 78-2018			
IAPMO IGC 115-2013e1			
IAPMO IGC 127-2018			
IAPMO IGC 154-2019	IAPMO IGC 154-2009		
	IAPMO IGC 157-2010		
	IAPMO IGC 193-2010		
	IAPMO IGC 217-2007		
IAPMO IGC 224-2018			
	IAPMO IGC 226-2006a		
IAPMO IGC 322-2018			
IAPMO IGC 349-2018			
IAPMO IGC 352-2018			
		IAPMO PS 1	
		IAPMO PS 2	
		IAPMO PS 4	IAPMO PS 2-1989
		IAPMO PS 5	IAPMO PS 4-1995
		IAPMO PS 7	IAPMO PS 5-1984
		IAPMO PS 9	IAPMO PS 7-1984
		IAPMO PS 10	IAPMO PS 9-1984
		IAPMO PS 13	
		IAPMO PS 14	IAPMO PS 13-1991
		IAPMO PS 16	IAPMO PS 14-1989
		IAPMO PS 22	IAPMO PS 16-1990
	IAPMO PS 23-2006a	IAPMO PS 23	
		IAPMO PS 25	IAPMO PS 23-1989
		IAPMO PS 31	
	IAPMO PS 33-2010c		IAPMO PS 31-1995
	IAPMO PS 34-2003	IAPMO PS 34	
		IAPMO PS 35	
	IAPMO PS 36-1990	IAPMO PS 36	
	IAPMO PS 37-1990	IAPMO PS 37	IAPMO PS 36-1990
		IAPMO PS 38	IAPMO PS 37-1990
			IAPMO PS 38-1991
			IAPMO PS 41-1991
	IAPMO PS 42-1996		
			IAPMO PS 44-1992
			IAPMO PS 46-1993
			IAPMO PS 45-1991
			IAPMO PS 47-1992
			IAPMO PS 49-1992
	IAPMO PS 50-2010		
	IAPMO PS 51-1998		
	IAPMO PS 52-2009		IAPMO PS 51-1992
	IAPMO PS 53-2008		
	IAPMO PS 54-2010		IAPMO PS 53-1992
	IAPMO PS 55-1992		
	IAPMO PS 57-2002		IAPMO PS 55-1992
			IAPMO PS 58-1992
IAPMO PS 59-2016ae1	IAPMO PS 59-2010		
	IAPMO PS 60-1996		
			IAPMO PS 61-1992
			IAPMO PS 62-1993

	IAPMO PS 63-2005		
	IAPMO PS 64-2007a		
IAPMO PS 65-2002	IAPMO PS 65-2002		IAPMO PS 65-1993
	IAPMO PS 66-2000		IAPMO PS 66-1993
	IAPMO PS 67-2010		
	IAPMO PS 69-2006		IAPMO PS 69-1993
			IAPMO PS 70-1993
			IAPMO PS 71-1993
	IAPMO PS 72-2007		IAPMO PS 72-1993
	IAPMO PS 73-1993		
			IAPMO PS 74-1995
	IAPMO PS 76-1995		
			IAPMO PS 77-1995
			IAPMO PS 78-1994
	IAPMO PS 79-2005		
	IAPMO PS 80-2008		IAPMO PS 80-1995
	IAPMO PS 81-2006		
	IAPMO PS 82-1995		IAPMO PS 82-1995
			IAPMO PS 83-1995
			IAPMO PS 84-1995
	IAPMO PS 85-1995		IAPMO PS 85-1995
			IAPMO PS 86-1995
	IAPMO PS 87-1995		
	IAPMO PS 88-2010		IAPMO PS 88-1995
			IAPMO PS 89-1995
IAPMO PS 90-2014	IAPMO PS 90-2006		IAPMO PS 90-1995
			IAPMO PS 91-1995
	IAPMO PS 92-2010		
			IAPMO PS 93-1995
	IAPMO PS 94-2008		IAPMO PS 94-1996
	IAPMO PS 95-2001		IAPMO PS 95-1996
	IAPMO PS 96-2002		
			IAPMO PS 97-1996
			IAPMO PS 98-1996
	IAPMO PS 99-2007		IAPMO PS 99-1996
			IAPMO PS 100-1996
	IAPMO PS 101-1997		
	IAPMO PS 104-1997		
	IAPMO PS 106-2010		
	IAPMO PS 110-2006a		
	IAPMO PS 111-1999		
	IAPMO PS 112-1999		
	IAPMO PS 113-2010		
	IAPMO PS 114-1999e1		
	IAPMO PS 115-2007		
	IAPMO PS 116-1999		
IAPMO PS 117-2017	IAPMO PS 117-2008		
			ANSI Z21.3B-1992
			ANSI Z21.4-1986
			ANSI Z21.4A-1990
			ANSI Z21.10.1A-1991
			ANSI Z21.10.1A-1994
			ANSI Z21.10.1B-1992
			ANSI Z21.10.3A-1994
			ANSI Z21.22a-1990
			ANSI Z21.32-1990
		ANSI Z21.10.3	
		ANSI Z21.10.11	
			ANSI Z21.12-1990
			ANSI Z21.13-1991
		ANSI Z21.22	
IAPMO Z124.5-2013e1		IAPMO Z124.1	IAPMO Z124.1-1995



		IAPMO Z124.2	IAPMO Z124.2-1995
		IAPMO Z124.3	IAPMO Z124.3-1995
		IAPMO Z124.4	
			IAPMO Z124.5-1989
			IAPMO Z124.6-1990
	IAPMO Z124.8-1990		
	IAPMO Z124.9-2004		
IAPMO Z601-2018			IAPMO Z124.9-1994
	IAPMO Z1000-2007		
IAPMO Z1001-2016	IAPMO Z1001-2007		
IAPMO Z1033-2015			
IAPMO Z1088-2013			
IAPMO Z1157-2014e1			

**Table 1.4 NSF & WQA Standards Referenced in ASEAN National Plumbing Codes**

Uniform Plumbing Code USA - 2021	SNI 8153 Indonesia - 2015	National Plumbing Code Philippines - 2000	Plumbing Code Vietnam - 1999
NSF 3-2017			NSF 3
	NSF 12-2009		
NSF 14-2018			NSF 14-1990
NSF 42-2018	NSF 42-2009		
NSF 44-2018	NSF 44-2009		
NSF 53-2017	NSF 53-2009e		
NSF 55-2018	NSF 55-2009		
NSF 58-2017	NSF 58-2009		
NSF 61-2018	NSF 61-2010a		
NSF 62-2018			
NSF 350-2017a			
NSF 359-2018			
		WQA S 100	
		WQA S 200	
WQA S-300-2000	WQA S-300-2000	WQA S 300	

## INDONESIA

As part of its review of technical regulations in Indonesia, IAPMO identified 10 regulations related to plumbing fittings and fixtures, 12 regulations related to piping, and one regulation related to water treatment technologies. Of the 23 total technical regulations included in this review, only three were included in a mandatory national quality mark scheme. Consistent with other findings across the region, compliance with these technical regulations was largely voluntary, which impacts the competitiveness of quality products.

Water efficiency is an area for future development in Indonesia. Maximum flow rates are established in the national plumbing code, but those values are not enforceable for products being manufactured in-country or on imported products. Requirements for high-efficiency products do not exist nor is there a nationally recognized labeling scheme to help consumers identify water-efficiency products.

Water quality is also an area for future development in Indonesia. Only one technical regulation for water treatment technologies has been adopted despite eight international standards being referenced in the national plumbing code. Additionally, technical regulations related to plumbing fittings and fixtures are of sufficient age that they do not include the latest advancements from industry in protecting Indonesia's water supply from unsafe components.

Additionally, growing nationalism globally and in ASEAN creates uncertainty for industry and potentially threatens trade. While not directed at the plumbing industry, actions being taken have a direct impact



SNI 03-0689-1989 SNI 03-0152-1987	Terrazzo bathtubs Enamel coated steel bathtubs		1989 1987	Voluntary	No	Yes, but no implementation yet
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**Table 2.2 Indonesia Technical Regulations – Piping**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a mandatory quality mark scheme?	Product included in a voluntary quality mark scheme?
SNI 06-0084-2002	PVC pipe for drinking water pipeline	Various references	1987	Voluntary	No	Yes, but no implementation yet
SNI 06-0135-1987	PVC pipes fittings for drinking water pipeline	Various references	1987	Voluntary	No	Yes, but no implementation yet
SNI 4829.1-2015	Plastics piping systems - polyethylene (PE) pipes and fittings for water supply - Part 1: General	ISO 4427-1:2007	2012	Voluntary	No	Yes, but no implementation yet
SNI 4829.2:2015	Plastics piping system - polyethylene (PE) pipes and fittings for water supply - Part 2: Pipes	ISO 4427-2:2007	2012	Voluntary	No	Yes, but no implementation yet
SNI 4829.3:2015	Plastics piping systems - Polyethylene (PE) pipes and fittings for water supply - Part 3: fitting	ISO 4427-2:2007	2012	Voluntary	No	Yes, but no implementation yet
SNI 06-0162-1987	PVC pipes for waste water pipeline, outside and inside building	Various references	1987	Voluntary	No	Yes, but no implementation yet
SNI 06-0178-1987	PVC pipes for waste water outside and inside buildings, Fittings	Various references	1987	Voluntary	No	Yes, but no implementation yet
SNI 8884-1:2020	Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General	ISO 4437-1:2014	2015	Voluntary	No	Yes, but no implementation yet
SNI 8884-2:2020	Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipe	ISO 4437-2:2014	2015	Voluntary	No	Yes, but no implementation yet
SNI 8884-3:2020	Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fitting	ISO 4437-3:2014	2015	Voluntary	No	Yes, but no implementation yet
SNI 0039:2013	Plumbing steel pipe with or without zinc coating	ASTM E350-12 BS 1387:198 BS EN 10255:2004 EN 10246-1 ASTM A53/A53M-10 AWWA C200-05 API 5L	1987	Mandatory	Yes	No
SNI 0139:2008	Black malleable cast iron threaded pipe fittings	ISO 228-1:1982(E) ISO 228-2:1987 ISO 7-1:1994(E) ISO 7-2:2000(E) JIS B 2301:1999 ISO 5922:1981	1987	Mandatory	Yes	No

**Table 2.3 Indonesia Technical Regulations – Water Treatment Technologies**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a mandatory quality mark scheme?	Product included in a voluntary quality mark scheme?
SNI 7531:2009	Water treatment equipment with ultra membrane	JIS K 3821-1990 JIS K 3822-1990	2009	Voluntary	No	Yes

## PHILIPPINES

As part of its review of technical regulations in the Philippines, IAPMO identified five regulations related to plumbing fittings and fixtures, 15 regulations related to piping, and five regulations related to water treatment technologies. Of the 26 total technical regulations included in this review, only five were included in a mandatory national quality mark scheme. Consistent with other findings across the region, compliance with the other technical regulations was largely voluntary, which impacts the competitiveness of quality products. The Philippines is unique in that sanitary wares (urinals, bidets, water closets and lavatories) fall under a mandatory certification scheme (PNS 156:2010). These products are required to bear the Philippine Standard (PS) Quality Mark. In addition to these requirements, specific plumbing fixtures may also be subject to other technical regulations which are currently not mandated or enforced.

Water efficiency is an area in which the Philippines has made some notable inroads. Maximum flow rates are established in the national plumbing code. In June 2015, the *Philippine Green Building Code (PGBC)* was approved (P.D. 1096). Similar to the national plumbing code, the *PGBC* is an official Referral Code of the *National Building Code of the Philippines*. The *PGBC* sets forward the following water fixture performance requirements:

Type of Fixture	Maximum Flow Rates	
Dual Flush Water Closet	≤6 full 3 low	Liters/flushing cycle
Single Flush Water Closet	4.9	Liters/flushing cycle
Shower	≤9 (80 PSI)	Liters/min at 551.6 kPa
Urinals	≤1	Liters/flushing cycle
Lavatory taps	≤4.8 (60 Psi)	Liters/min at 417.7 kPa
Kitchen faucets	≤4.8 (60 Psi)	Liters/min at 417.7 kPa
Handheld bidet sprays	≤4.8 (60 Psi)	Liters/min at 417.7 kPa

Water-efficiency enforcement continues to be a challenge, as there are no technical regulations that prevent inefficient products from being imported and building enforcement at the point of installation is limited. In 2016, the Bureau of Philippine Standards (BPS) developed PNS 2122:2017 Plumbing fixtures – labelling to help consumers identify water-efficient products. This standard was jointly developed and prepared by BPS and the USAID-funded Water Security for Resilient Economic Growth and Stability (Be Secure) Project in the Philippines. Compliance with PNS 2122:2017 is voluntary.

Water quality is also an area for future work in the Philippines. The national plumbing code references three standards produced by the Water Quality Association and the country has adopted five NSF International standards into its technical regulations. Compliance with these standards is voluntary.

**Table 3.1 Philippines Technical Regulations – Plumbing Fittings & Fixtures**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a <u>mandatory</u> quality mark scheme?	Product included in a <u>voluntary</u> quality mark scheme?
PNS 156:2010	Ceramic plumbing fixtures	ASME A112.19.2-2008	2000	Mandatory	Yes	Yes
PNS 237:2000	Water closet tank fittings - Specification	ASME A112.19.5-1979	1989	Voluntary	No	No
PNS 2084:2011	Six-Liter water closets equipped with a dual flushing device	ASME A112.19.14-2006	2006	Voluntary	Yes	Yes
PNS 2085:2011	Ceramic plumbing fixtures - Pail flush water closet	ASME A112.19.2-2008	2011	Voluntary	Yes	Yes
PNS 2122:2017	Plumbing Fixtures - labelling		2017	Voluntary	No	No

**Table 2.2 Philippines Technical Regulations – Piping**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a <u>mandatory</u> quality mark scheme?	Product included in a <u>voluntary</u> quality mark scheme?
PNS 65:2018	Unplasticized Poly(vinyl chloride) (PVC-U) Pipes for Potable Water Supply – Specification		1993	Mandatory	Yes	No
PNS 152:2003	Polybutylene (PB) pipes for potable water supply - Specification	Various ASTM & ISO standards	1987	Mandatory	Yes	No
PNS 303:2006	Specifications for malleable cast iron threaded pipe fittings		2006	Voluntary	No	No
PNS 1176:1993	Unplasticized polyvinyl chloride (PVC) pipes -- Specification and measurement of opacity	ISO 3474:1976	1993	Voluntary	No	No
PNS ISO 1452-1:2018	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure – Unplasticized poly(vinyl chloride) (PVC-U) – Part 1: General	ISO 1452-1:2009	2018	Voluntary	No	No
PNS ISO 1452-5:2018	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure – Unplasticized poly(vinyl chloride) (PVC-U) – Part 5: Fitness for purpose of the system	ISO 1452-5:2009	2018	Voluntary	No	No
PNS 1570:1998	Standard specification for hubless cast iron soil pipe and fittings for sanitary and storm drain, waste, and vent piping applications	ASTM A 888:1995	1998	Voluntary	No	No
PNS 1950:2010	Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings – Unplasticized poly(vinyl chloride) (PVC-U)	Various ASTM & ISO standards	2003	Mandatory	Yes	No
PNS 2154:2020	Polyethylene (PE) pipes for water supply, and for drainage and sewerage under pressure – Specification	ISO 4427-1:2019 ISO 4427-2:2019	2002	Voluntary	No	No

PNS ISO 3114:2006	Unplasticized polyvinyl chloride (PVC) pipes for potable water supply - Extractability of lead and tin - Test method	ISO 3114:1977	2006	Voluntary	No	No
PNS ISO 4427:2002	Polyethylene (PE) pipes for potable water supply — Specification	ISO 4427:1996	1986	Voluntary	No	No
PNS ISO 4427-5:2020	Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 5: Fitness for purpose of the system	ISO 4427-5:2020	2020	Mandatory	Yes	No
PNS ISO 4633:2007	Rubber seals - Joint rings for water supply, drainage and sewerage pipelines - Specification for materials	ISO 4633:2002	1996	Voluntary	No	No
PNS ISO 9852:2010	Unplasticized poly(vinyl chloride) (PVC-U) pipes - Dichloromethane resistance at specified temperature (DCMT) - Test method	ISO 9852:2007	2010	Voluntary	No	No

**Table 3.3 Philippines Technical Regulations – Water Treatment Technologies**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a <u>mandatory</u> quality mark scheme?	Product included in a <u>voluntary</u> quality mark scheme?
PNS BHDT NSF ANSI 42:2011	Drinking water treatment units-aesthetic effects	NSF 42:2007	2011	Voluntary	No	No
PNS BHDT/NSF/ANSI 53:2015	Drinking water treatment units - Health effects	NSF 53:2012	2007	Voluntary	No	No
PNS BHDT/NSF/ANSI 58:2014	Reverse osmosis drinking water treatment systems	NSF 58:2012	2014	Voluntary	No	No
PNS BHDT/NSF/ANSI 61:2014	Drinking Water System Components - Health Effects	NSF 61:2013	2014	Voluntary	No	No
PNS NSF ANSI 62:2015	Drinking water treatment units - Drinking water distillation systems	NSF 62:2013	2015	Voluntary	No	No

## VIETNAM

As part of its review of technical regulations in Vietnam, IAPMO identified 42 regulations related to plumbing fittings and fixtures, 169 regulations related to piping, and two regulations related to water treatment technologies. Of the 213 total technical regulations included in this review, 130 are considered mandatory, of which 128 relate to piping. Consistent with other findings across the region, compliance with technical regulations related to plumbing fittings and fixtures was largely voluntary, which impacts the competitiveness of quality products. Vietnam is also unique in that the international standards upon which its technical regulations are primarily based are European or ISO standards with very few references to industry-developed international standards. Future engagement with the Directorate for Standards, Metrology and Quality of Vietnam (STAMEQ) will be important.

Water efficiency is an area for future development in Vietnam. Maximum flow rates are established in the national plumbing code, but those values are not enforceable for products being manufactured in-

country or on imported products. Requirements for high-efficiency products do not exist, nor is there a nationally recognized labeling scheme to help consumers identify water-efficiency products.

Water quality is also an area for future development in Vietnam. Only one technical regulation for water treatment technologies has been adopted and just two international standards are referenced in the national plumbing code. Additionally, lack of mandatory requirements related to water treatment technologies and plumbing fittings hinders Vietnam’s ability to protect its water supply from contaminants.

**Table 4.1 Vietnam Technical Regulations – Plumbing Fittings & Fixtures**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a <u>mandatory</u> quality mark scheme?	Product included in a <u>voluntary</u> quality mark scheme?
TCVN 11718:2016	Sanitary tapware – Shower hoses for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification	BS EN 1113:2015	2016	Voluntary	NO	YES
TCVN 12646:2020	Shower hoses - General technical requirements for Ni-Cr electroplating		2020	Voluntary	NO	YES
TCVN 11717:2016	Sanitary tapware – Shower outlets for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification	BS EN 1112:2008	2016	Voluntary	NO	YES
TCVN 11869:2017	Sanitary tapware - General specifications for flow rate regulators	BS EN 246:2008	2017	Voluntary	NO	YES
TCVN 12496:2018	Sanitary tapware Electronic opening and closing sanitary tapware	EN 15091:2013	2018	Voluntary	NO	YES
TCVN 12500:2018	Sanitary tapware – Water efficiency		2018	Voluntary	NO	YES
TCVN 12495:2018	Sanitary tapware - Pressure flushing valves and automatic closing urinal valves PN 10	EN 12541:2002	2018	Voluntary	NO	YES
TCVN 12494:2018	Sanitary tapware. Automatic shut-off valves PN 10	EN 816:2017	2018	Voluntary	NO	YES
TCVN 4063:1985	Short-range sprinklers - Main parameters and dimensions		1985	Voluntary	NO	YES
TCVN 11870-1:2017	Waste fittings for sanitary appliances - Part 1: Requirements	BS EN 274-1:2002	2017	Voluntary	NO	YES
TCVN 11870-2:2017	Waste fitting for sanitary appliances - Part 2: Test methods	BS EN 274-2:2002	2017	Voluntary	NO	YES
TCVN 12648:2020	Sanitary ware - Sinks - Performance requirements and test methods		2020	Voluntary	NO	YES
TCVN 11720:2016	Kitchen sinks – Functional requirements and test methods	BS EN 13310:2003	2016	Voluntary	NO	YES
TCVN 11719:2016	Kitchen sinks – Connecting dimensions	BS EN 695:2005	2016	Voluntary	NO	YES

TCVN 7743:2007	Ceramic sanitary wares - Terminology, definition and classification		2007	Voluntary	NO	YES
TCVN 6073:2005	Sanitary ceramic wares - Specifications		1995	Voluntary	NO	YES
TCVN 5436:2006	Sanitary ceramic articles - Test methods		1998	Voluntary	NO	YES
TCVN 11870-1:2017	Waste fittings for sanitary appliances - Part 1: Requirements	BS EN 274-1:2002	2017	Voluntary	NO	YES
TCVN 11870-2:2017	Waste fitting for sanitary appliances - Part 2: Test methods	BS EN 274-2:2002	2017	Voluntary	NO	YES
TCVN 12501:2018	Sanitary wares – WC pans – Water efficiency		2018	Voluntary	NO	YES
TCVN 12647:2020	Squat toilet		2020	Voluntary	NO	YES
TCVN 12649:2020	Toilet seats and toilet sets with built-in water trap		2020	Voluntary	NO	YES
TCVN 12650:2020	Sanitary ware products - Quality requirements of sanitary ware		2020	Voluntary	NO	YES
TCVN 6073:2005	Sanitary ceramic wares - Specifications		1995	Voluntary	NO	YES
TCVN 6073:2005	Sanitary ceramic wares - Specifications		1995	Voluntary	NO	YES
TCVN 12498:2018	WC and urinal flushing cisterns	EN 14055:2018	2018	Voluntary	NO	YES
TCVN 12499:2018	Wall-hung urinals - Connecting dimensions	EN 80:2001	2018	Voluntary	NO	YES
TCVN 12652:2020	Female urinals - Functional requirements and test methods		2020	Voluntary	NO	YES
TCVN 12651:2020	Wall-mounted male urinals - Functional requirements and test methods		2020	Voluntary	NO	YES
TCVN 12495:2018	Sanitary tapware - Pressure flushing valves and automatic closing urinal valves PN 10	EN 12541:2002	2018	Voluntary	NO	YES
TCVN 6073:2005	Sanitary ceramic wares - Specifications		1995	Voluntary	NO	YES
TCVN 6073:2005	Sanitary ceramic wares - Specifications		1995	Voluntary	NO	YES
TCVN 11716:2016	Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specification	BS EN 1111:1999	2016	Voluntary	NO	YES
TCVN 11869:2017	Sanitary Tapware. General specifications for flow rate regulators	BS EN 246:2008	2017	Voluntary	NO	YES
TCVN 11715:2016	Sanitary tapware – Mechanical mixing valves (PN 10) – General technical specification	BS EN 817:2008	2016	Voluntary	NO	YES
TCVN 12496:2018	Sanitary tapware: Electronic opening and closing sanitary tapware	EN 15091:2013	2018	Mandatory	NO	NO
TCVN 11870-1:2017	Waste fittings for sanitary appliances - Part 1: Requirements	BS EN 274-1:2002	2017	Voluntary	NO	YES
TCVN 11870-2:2017	Waste fitting for sanitary appliances - Part 2: Test methods	BS EN 274-2:2002	2017	Voluntary	NO	YES



TCVN 12494:2018	Sanitary tapware. Automatic shut-off valves PN 10	EN 816:2017	2018	Voluntary	NO	YES
TCVN 12495:2018	Sanitary tapware - Pressure flushing valves and automatic closing urinal valves PN 10	EN 12541:2002	2018	Voluntary	NO	YES
TCVN 1385:1985	Pipeline valves - Steel swing check valves for Phom up to 16 MPa - Technical requirements		1985	Mandatory	YES	NO
TCVN 6305-6:2013	Fire protection - Automatic sprinkler systems - Part 6: Requirements and test methods for check valves	ISO 6182-6:2006	2013	Voluntary	NO	YES

**Table 4.2 Vietnam Technical Regulations – Piping**

<b>National regulation reference number</b>	<b>National regulation title</b>	<b>International Standard Reference</b>	<b>Year 1st Adopted</b>	<b>Status</b>	<b>Product included in a mandatory quality mark scheme?</b>	<b>Product included in a voluntary quality mark scheme?</b>
TCVN 6250:1997	Unplasticized polyvinyl chloride (PVC-U) pipes for water supply - Recommended practice for laying	ISO 4191:1989	1997	Mandatory	YES	NO
TCVN 6150-2:2003	Thermoplastics pipes for the conveyance of fluids - Nominal outside diameters and nominal pressures - Part 2: Inch series	ISO 161-2: 1996	1996	Mandatory	YES	NO
TCVN 6253:2003	Plastics piping systems for the transport of water intended for human consumption - Migration assessment - Determination of migration values of plastics pipes and fittings and their joints	ISO 8795: 2001	1996	Mandatory	YES	NO
TCVN 7093-2:2003	Thermoplastics pipes for the conveyance of fluids - Dimensions and tolerances - Part 2: Inch series	ISO 11922-2: 1997	2003	Mandatory	YES	NO
TCVN 6149-1:2007	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 1: General method	ISO 01167-1:2006	2007	Mandatory	YES	NO
TCVN 6149-2:2007	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 2: Preparation of pipe test pieces	ISO 01167-2:2006	2007	Mandatory	YES	NO
TCVN 6149-3:2009	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 3: Preparation of components	ISO 1167-3:2007	2009	Mandatory	YES	NO

TCVN 6149-4:2009	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 4: Preparation of assemblies	ISO 1167-4:2007	2009	Mandatory	YES	NO
TCVN 7305-1:2008	Plastics piping systems - Polyethylene (PE) pipes and fittings for water supply - Part 1: General	ISO 4427-1:2007	2008	Mandatory	YES	NO
TCVN 7305-2:2008	Plastics piping systems - Polyethylene (PE) pipes and fittings for water supply - Part 2: Pipes	ISO 4427-2:2007	2008	Mandatory	YES	NO
TCVN 7305-3:2008	Plastics piping systems - Polyethylene (PE) pipes and fittings for water supply - Part 3: Fittings	ISO 4427-3:2007	2008	Mandatory	YES	NO
TCVN 7305-5:2008	Plastics piping systems - Polyethylene (PE) pipes and fittings for water supply - Part 5: Fitness for purpose of the system	ISO 4427-5:2007	2008	Mandatory	YES	NO
TCVN 8199:2009	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Small-scale steady-state test (S4 test)	ISO 13477:2008	2009	Mandatory	YES	NO
TCVN 8200:2009	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Full-scale test (FST)	ISO 13478:2007	2009	Mandatory	YES	NO
TCVN 8491-3:2011	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 3: Fittings	ISO 1452-3:2009, modified	2011	Mandatory	YES	NO
TCVN 8491-2:2011	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 2: Pipes	ISO 1452-2:2009, modified	2011	Mandatory	YES	NO
TCVN 8491-1:2011	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: General	ISO 1452-1:2009	2011	Mandatory	YES	NO
TCVN 8491-4:2011	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 4: Valves	ISO 1452-4:2009	2011	Mandatory	YES	NO

TCVN 8491-5:2011	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 5: Fitness for purpose of the system	ISO 1452-5:2009	2011	Mandatory	YES	NO
TCVN 8492:2011	Spiral winding pipes of unplasticized poly (vinyl chloride) for non-pressure underground drainage and sewerage systems -		2011	Mandatory	YES	NO
TCVN 10097-1:2013	Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 1: General	ISO 15874-1:2013	2013	Mandatory	YES	NO
TCVN 10097-2:2013	Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 2: Pipes	ISO 15874-2:2013	2013	Mandatory	YES	NO
TCVN 10097-3:2013	Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 3: Fittings	ISO 15874-3:2013	2013	Mandatory	YES	NO
TCVN 10097-5:2013	Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 5: Fitness for purpose of the system	ISO 15874-5:2013	2013	Mandatory	YES	NO
TCVN 10097-7:2013	Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 7: Guidance for the assessment of conformity	ISO/TS 15874-7:2003	2013	Mandatory	YES	NO
TCVN 10098-1:2013	Multilayer piping systems for hot and cold water installations inside buildings - Part 1: General	ISO 21003-1:2008	2013	Mandatory	YES	NO
TCVN 10098-2:2013	Multilayer piping systems for hot and cold water installations inside buildings - Part 2: Pipes	ISO 21003-2:2008	2013	Mandatory	YES	NO
TCVN 10098-3:2013	Multilayer piping systems for hot and cold water installations inside buildings - Part 3: Fittings	ISO 21003-3:2008	2013	Mandatory	YES	NO
TCVN 10098-5:2013	Multilayer piping systems for hot and cold water installations inside buildings - Part 5: Fitness for purpose of the system	ISO 21003-5:2008	2013	Mandatory	YES	NO
TCVN 10098-7:2013	Multilayer piping systems for hot and cold water installations inside buildings - Part 7: Guidance for the assessment of conformity	ISO/TS 21003-7:2008	2013	Mandatory	YES	NO
TCVN 9562:2017	Plastics piping systems for pressure and non-pressure water supply - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin	ISO 10639:2017	2013	Mandatory	YES	NO

TCVN 12724-2:2020	Thermoplastics pipes for the transport of fluids – Determination of pendulum impact strength by the Charpy method – Part 2: Test conditions for pipes of various materials	ISO 9854-2:1994	2020	Mandatory	YES	NO
TCVN 7093-1:2020	Thermoplastics pipes for the conveyance of fluids – Dimensions and tolerances - Part 1: Metric series	ISO 11922-1:2018	2003	Mandatory	YES	NO
TCVN 12725:2020	Pipes and joints made of oriented unplasticized poly(vinyl chloride) (PVC-O) for the conveyance of water under pressure – Specifications	ISO 16422:2014	2020	Mandatory	YES	NO
TCVN 6150-1:2020	Thermoplastics pipes for the conveyance of fluids – Nominal outside diameters and nominal pressures – Part 1: Metric series	ISO 161-1:2018	1996	Mandatory	YES	NO
TCVN 10968:2015	Plastics piping systems for pressure and non-pressure drainage and sewerage -- Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin -- Test methods to prove the design of cemented or wrapped joints	ISO 8533:2003, WITH AMENDMENT 1:2012	2015	Mandatory	YES	NO
TCVN 11821-1:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 1: Material specifications and performance criteria for pipes, fittings and system	ISO 21138-1:2007	2017	Mandatory	YES	NO
TCVN 11821-2:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 2: Pipes and fittings with smooth external surface, Type A	ISO 21138-2:2007	2017	Mandatory	YES	NO
TCVN 11821-3:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 3: Pipes and fittings with non-smooth external surface, Type B	ISO 21138-3:2007	2017	Mandatory	YES	NO

TCVN 12119:2018	Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings -- Unplasticized poly(vinyl chloride) (PVC-U)	ISO 3633:2002	2018	Mandatory	YES	NO
TCVN 12304:2018	Plastic pipe system for drainage and wastewater, underground, not under pressure – Polyethylene (PE)	ISO 8772:2006	2018	Mandatory	YES	NO
TCVN 12305:2018	Plastics piping systems for non-pressure underground drainage and sewerage – Polypropylene (PP)	ISO 8773:2006	2018	Mandatory	YES	NO
TCVN 12754:2020	Unplasticized Polyvinyl Chloride (PVC-U) Manholes for Domestic Wastewater System	JSWAS K-9-2008	2020	Mandatory	YES	NO
TCVN 12724-1:2020	Thermoplastics pipes for the transport of fluids – Determination of pendulum impact strength by the Charpy method – Part 1: General test method	ISO 9854-1:1994	2020	Mandatory	YES	NO
TCVN 12755:2020	Unplasticized Polyvinyl Chloride (PVC-U) Inspection Chamber for Domestic Wastewater System	JSWAS K-7-2008	2020	Mandatory	YES	NO
TCVN 3989:2012	System of documents for building design - Water supply and drainage - External network - Working drawings		2012	Mandatory	YES	NO
TCVN 5673:2012	System of building design documents -Water supply and sewerage - Working drawings		2012	Mandatory	YES	NO
TCVN 6036:1995	Unplasticized polyvinyl chloride (PVC) pipes - Specification and determination of resistance to acetone	ISO 3472:1975	1995	Mandatory	YES	NO
TCVN 6037:1995	Unplasticized polyvinyl chloride (PVC) pipes - Effect of sulphuric acid - Requirement and test method	ISO 3473:1975	1995	Mandatory	YES	NO
TCVN 6038:1995	Unplasticized polyvinyl chloride (PVC) pipes and fittings - Determination and specification of density	ISO 4439:1979	1995	Mandatory	YES	NO
TCVN 6040:1995	Fittings for unplasticized polyvinyl chloride (PVC) pressure pipes with elastic sealing ring type joints - Pressure test for leak proofness	ISO 3603:1977	1995	Mandatory	YES	NO
TCVN 6041:1995	Fittings for unplasticized polyvinyl chloride (PVC) pressure - Test for leak proofness under conditions of external hydraulic pressure	ISO 3604:1976	1995	Mandatory	YES	NO
TCVN 6042:1995	Unplasticized polyvinyl chloride (PVC) pipes - Water absorption - Determination and specification	ISO 2508:1981	1995	Mandatory	YES	NO
TCVN 6139:1996	Unplasticized polyvinyl chloride (PVC-U) pipes - Dichloromethane test	ISO 7676:1990	1996	Mandatory	YES	NO

TCVN 6143:1996	Unplasticized polyvinyl chloride (PVC) pipes - Specification and measurement of opacity	ISO 3474:1976	1996	Mandatory	YES	NO
TCVN 6144:2003	Thermoplastics pipes - Determination of resistance to external blows - Round-the-clock method	ISO 3127: 1994	1996	Mandatory	YES	NO
TCVN 6145:2007	Plastics piping systems - Plastics components - Determination of dimensions	ISO 03126:2005	1996	Mandatory	YES	NO
TCVN 6146:1996	Unplasticized polyvinyl chloride (PVC) pipes for potable water supply - Extractability of lead and tin - Test methods	ISO 3114 : 1977	1996	Mandatory	YES	NO
TCVN 6147-1:2003	Thermoplastics pipes and fittings - Vicat softening temperature - Part 1: General test method	ISO 2507-1:1995	1996	Mandatory	YES	NO
TCVN 6147-2:2003	Thermoplastics pipes and fittings - Vicat softening temperature - Part 2: Test conditions for unplasticized poly(vinyl chloride) (PVC-U) or chlorinated poly(vinyl chloride) (PVC-C) pipes and fittings and for high impact resistance poly(vinyl chloride) (PVC-HI) pipes	ISO 2507-2:1995	1996	Mandatory	YES	NO
TCVN 6147-3:2003	Thermoplastics pipes and fittings - Vicat softening temperature - Part 3: Test conditions for acrylonitrile/butadiene/styrene (ABS) and acrylonitrile/styrene/acrylic ester (ASA) pipes and fittings	ISO 2507-3:1995	1996	Mandatory	YES	NO
TCVN 6148:2007	Thermoplastics pipes - Longitudinal reversion - Test method and parameters	ISO 02505:2005	1996	Mandatory	YES	NO
TCVN 6242:2011	Plastics piping and ducting systems - Injection-molded thermoplastics fittings - Methods for visually assessing the effects of heating	ISO 580:2005	2011	Mandatory	YES	NO
TCVN 6243-1:2003	Fittings made from unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) or acrylonitrile/butadiene/styrene (ABS) with plain sockets for pipes under pressure - Part 1: Metric series	ISO 727-1:2002	2003	Mandatory	YES	NO
TCVN 6244:1997	Unplasticized polyvinyl chloride (PVC) molded fittings for elastic sealing ring type joints for use under pressure - Pressure resistance test	ISO 2035:1974	1997	Mandatory	YES	NO
TCVN 6245:1997	Unplasticized polyvinyl chloride (PVC) injection molded solvent welded socket fittings for use with pressure pipe - Hydraulic internal pressure test	ISO 2044:1974	1997	Mandatory	YES	NO

TCVN 6248:1997	Unplasticized polyvinyl chloride (PVC) pressure pipes and fittings, metric series - Dimensions of flanges	ISO 2536:1974	1997	Mandatory	YES	NO
TCVN 6249:1997	Unplasticized polyvinyl chloride (PVC) and metal adaptor fitting for pipes under pressure - Laying lengths and size of threads - Metric series	ISO 4132:1979	1997	Mandatory	NO	NO
TCVN 7306:2008	Unplasticized poly(vinyl chloride) (PVC-U) pipes - Dichloromethane resistance at specified temperature (DCMT) - Test method	ISO 9852:2007	2003	Mandatory	YES	NO
TCVN 7433-1:2004	Thermoplastics pipes and fittings - Determination of melt mass-flow rate - Part 1: Test method	ISO 4440-1:1994	2004	Mandatory	YES	NO
TCVN 7433-2:2004	Thermoplastics pipes and fittings - Determination of melt mass-flow rate - Part 2: Test conditions	ISO 4440-2:1994	2004	Mandatory	YES	NO
TCVN 7434-1:2020	Thermoplastics pipes – Determination of tensile properties – Part 1: General test method	ISO 6259-1:2015	2020	Mandatory	YES	NO
TCVN 7434-2:2004	Thermoplastics pipes - Determination of tensile properties - Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)	ISO 6259-2:1997	2004	Mandatory	YES	NO
TCVN 7434-3:2020	Thermoplastics pipes – Determination of tensile properties – Part 3: Polyolefin pipes	ISO 6259-3:2015	2020	Mandatory	YES	NO
TCVN 7614-1:2007	Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels - Part 1: Pipes for a maximum operating pressure of 1 bar (100 kPa)	ISO 06993-1:2006	2007	Mandatory	YES	NO
TCVN 7614-2:2007	Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels - Part 2: Fittings for a maximum operating pressure of 200 mbar (20 kPa)	ISO 06993-2:2006	2007	Mandatory	YES	NO
TCVN 7614-3:2007	Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels - Part 3: Fittings and saddles for a maximum operating pressure of 1 bar (100 kPa)	ISO 06993-3:2006	2007	Mandatory	YES	NO
TCVN 7614-4:2007	Buried, high-impact poly(vinyl chloride) (PVC-HI) piping systems for the supply of gaseous fuels - Part 4: Code of practice for design, handling and installation	ISO 06993-4:2006	2007	Mandatory	YES	NO

TCVN 7615:2007	Determination of the thermal stability of polyethylene (PE) for use in gas pipes and fittings	ISO/TR 10837:1991	2007	Mandatory	YES	NO
TCVN 8201:2009	Polyethylene (PE) pipes and fittings - Determination of the tensile strength and failure mode of test pieces from a butt-fused joint	ISO 13953:2001	2009	Mandatory	YES	NO
TCVN 8848:2011	Plastics pipes and fittings - Determination of opacity	ISO 7686:2005	2011	Mandatory	YES	NO
TCVN 8849:2011	Thermoplastics pipes - Determination of creep ratio	ISO 9967:2007	2011	Mandatory	YES	NO
TCVN 8850:2011	Thermoplastics pipes - Determination of ring stiffness	ISO 9969:2007	2011	Mandatory	YES	NO
TCVN 8851:2011	Plastics piping and ducting systems - Thermoplastics pipes - Determination of ring flexibility	ISO 13968:2008	2011	Mandatory	YES	NO
TCVN 9562:2017	Plastics piping systems for pressure and non-pressure water supply - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin	ISO 10639:2017	2013	Mandatory	YES	NO
TCVN 9576:2013	Thermoplastics piping systems for non-pressure applications -- Unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings -- Determination of the viscosity number and K-value	ISO 13229:2010	2013	Mandatory	YES	NO
TCVN 9577:2013	Thermoplastics piping systems for non-pressure applications -- Test method for watertightness	ISO 13254:2010	2013	Mandatory	YES	NO
TCVN 9578:2013	Thermoplastics piping systems for non-pressure applications -- Test method for resistance to elevated temperature cycling	ISO 13257:2010	2013	Mandatory	YES	NO
TCVN 10766:2015	Plastics piping systems -- Glass-reinforced plastics (GRP) components -- Determination of the amounts of constituents using the gravimetric method	ISO 7510:1997	2015	Mandatory	YES	NO
TCVN 10767:2015	Plastics piping systems - Glass-reinforced plastics (GRP) components - Determination of the amounts of constituents using the gravimetric method	ISO 7511:1997	2015	Mandatory	YES	NO
TCVN 10768:2015	Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes -- Determination of the creep factor under dry conditions	ISO 7684:1997	2015	Mandatory	YES	NO
TCVN 10769:2015	Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes -- Determination of initial specific ring stiffness	ISO 7685:1998	2015	Mandatory	YES	NO
TCVN 10770:2015	Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes -- Test methods for the determination of the apparent initial circumferential tensile strength	ISO 8521:2009	2015	Mandatory	YES	NO



TCVN 10771:2015	Glass-reinforced thermosetting plastics (GRP) pipes and fittings -- Test methods for leak tightness of flexible joints	ISO 8639:2000	2015	Mandatory	YES	NO
TCVN 10966:2015	Plastics piping systems for pressure and non-pressure drainage and sewerage -- Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin -- Test methods to prove the design of bolted flange joints	ISO 8483:2003, with amendment 1:2012	2015	Mandatory	YES	NO
TCVN 10967:2015	Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes -- Test methods for the determination of the initial longitudinal tensile strength	ISO 8513:2014	2015	Mandatory	YES	NO
TCVN 10969:2015	Plastics piping systems -- Glass-reinforced thermosetting plastics (GRP) pipes -- Test method to prove the resistance to initial ring deflection	ISO 10466:1997	2015	Mandatory	YES	NO
TCVN 10970:2015	Glass-reinforced thermosetting plastics (GRP) pipes -- Determination of the long-term specific ring creep stiffness under wet conditions and calculation of the wet creep factor	ISO 10468:2003, with amendment 1:2010	2015	Mandatory	YES	NO
TCVN 10971:2015	Glass-reinforced thermosetting plastics (GRP) pipes -- Determination of the long-term ultimate bending strain and the long-term ultimate relative ring deflection under wet conditions	ISO 10471:2003, With amendment 1:2010	2015	Mandatory	YES	NO
TCVN 7613-1:2016	Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 1: General	ISO 4437-1:2014	2016	Mandatory		NO
TCVN 7613-2:2016	Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 2: Pipes	ISO 4437-2:2014	2016	Mandatory	YES	NO
TCVN 7613-3:2016	Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 3: Fittings	ISO 4437-3:2014	2016	Mandatory	YES	NO
TCVN 7613-4:2016	Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 4: Valves	ISO 4437-4:2015	2016	Mandatory	YES	NO
TCVN 7613-5:2016	Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 5: Fitness for purpose of the system	ISO 4437-5:2014	2016	Mandatory	YES	NO
TCVN 11623:2016	Plastics pipes and fittings – Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting	ISO 11413:2008	2016	Mandatory	YES	NO

TCVN 11624:2016	Plastics pipes and fittings – Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion	ISO 11414:2009	2016	Mandatory	YES	NO
TCVN 11625:2016	Plastics pipes and fittings – Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm	ISO 13954:1997	2016	Mandatory	YES	NO
TCVN 11626:2016	Plastics piping and ducting systems – Plastics pipes and fittings – Method for exposure to direct (natural) weathering	ISO 16871:2003	2016	Mandatory	YES	NO
TCVN 11627:2016	Method for the assessment of the degree of pigment of carbon black dispersion in polyolefin pipes, fittings and compounds	ISO 18553:2002; WITH AMENDMENT 1:2007	2016	Mandatory	YES	NO
TCVN 12009:2017	Rubber and plastics hoses and tubing -- Determination of transmission of liquids through hose and tubing walls	ISO 8308:2015	2017	Mandatory	YES	NO
TCVN 12007:2017	Rubber and plastic hoses and hose assemblies for measured fuel dispensing systems -- Specification	ISO 5772:2015	2017	Mandatory	YES	NO
TCVN 11822:2017	Modified poly(vinyl chloride) (PVC-M) pipes for pressure applications		2017	Mandatory	YES	NO
TCVN 12008:2017	Rubber and plastics hoses -- Method of test for flammability	ISO 8030:2014	2017	Mandatory	YES	NO
TCVN 12117:2017	Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Determination of the resistance to chemical attack for the inside of a section in a deflected condition	ISO 10952:2014	2017	Mandatory	YES	NO
TCVN 11821-1:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 1: Material specifications and performance criteria for pipes, fittings and system	ISO 21138-1:2007	2017	Mandatory	YES	NO
TCVN 11821-2:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 2: Pipes and fittings with smooth external surface, Type A	ISO 21138-2:2007	2017	Mandatory	YES	NO

TCVN 11821-3:2017	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 3: Pipes and fittings with non-smooth external surface, Type B	ISO 21138-3:2007	2017	Mandatory	YES	NO
TCVN 12116:2017	Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes - Determination of time to failure under sustained internal pressure	ISO 7509:2015	2017	Mandatory	YES	NO
TCVN 12117:2017	Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Determination of the resistance to chemical attack for the inside of a section in a deflected condition	ISO 10952:2014	2017	Mandatory	YES	NO
TCVN 12118:2017	Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Test method to prove the structural design of fittings	ISO 18851:2015	2017	Mandatory	YES	NO
TCVN 12307:2018	Plastics piping systems – Test method for the resistance of plastic pipe/pipe or pipe/fitting assemblies to tensile loading	ISO 13951:2015	2018	Mandatory	YES	NO
TCVN 12309:2018	Thermoplastics fittings – Determination of ring stiffness	ISO 13967:2009	2018	Mandatory	YES	NO
TCVN 12653-1:2019	Fire protection - CPVC pipe and fittings used in automatic sprinkler system - Part 1: Technical requirements	IS 16088:2012, ASTM F 438-04, ASTM F 442/F 442M-99, UL 1821	2019	Mandatory	YES	NO
TCVN 12653-2:2019	Fire protection - CPVC pipe and fittings used in automatic sprinkler system - Part 2: Test methods	ASTM F 438-04, ASTM F 439-13, ASTM F 442/F 442M-99, IS 16088:2012, UL 1821	2019	Mandatory	YES	NO
TCVN 6141:2020	Thermoplastics pipes – Universal wall thickness table	ISO 4065:2018	2020	Mandatory	YES	NO
TCVN 12726:2020	Plastics pipes and fittings – Butt fusion jointing procedures for polyethylene (PE) piping systems	ISO 21307:2017	2020	Mandatory	YES	NO
TCVN 12727:2020	Plastics pipes and fittings – Pressure reduction factors for polyethylene pipeline systems for use at temperatures above 20 degrees celsius	ISO 13761:2017	2020	Mandatory	YES	NO
TCVN 12912:2020	Rubber and plastics hoses – Assessment of ozone resistance under static conditions	ISO 7326:2016	2020	Mandatory	YES	NO
TCVN 9832:2013	Capillary solder fittings for copper tubes - Assembly dimensions and tests	ISO 2016:1981	2013	Voluntary	NO	YES

TCVN 2942 : 1993	Cast iron pipes and fittings for main pressurized pipeline system.		1979	Voluntary	NO	YES
TCVN 2943:1979	Cast iron pipes and fittings for water piping - Cast iron pipes with socket - Basic dimensions		1979	Voluntary	NO	YES
TCVN 7703-1:2007	Ductile iron pipes - External zinc coating - Part 1: Metallic zinc with finishing layer	ISO 8179-1:1995	2007	Voluntary	NO	YES
TCVN 7703-2:2007	Ductile iron pipes - External zinc coating - Part 2: Zinc rich paint with finishing layer	ISO 8179-2:1995	2007	Voluntary	NO	YES
TCVN 10177:2013	Ductile iron pipes, fittings, accessories and their joints for water applications	ISO 2531:2009	2013	Voluntary	NO	YES
TCVN10178:2013	Ductile iron pipes and fittings for pressure and non-pressure pipelines - Cement mortar lining	ISO 4179:2005	2013	Voluntary	NO	YES
TCVN 10179:2013	Cast iron drainage pipes and fitting - Spigot series	ISO 6594:2006	2013	Voluntary	NO	YES
TCVN 10180:2013	Ductile iron products for sewerage applications	ISO 7186:2011	2013	Voluntary	NO	YES
TCVN 10181:2013	Ductile iron pipelines – Polyethylene sleeving for site application	ISO 8180:2006	2013	Voluntary	NO	YES
TCVN 10182:2013	Pre-insulated ductile iron pipeline systems	ISO 9349:2004	2013	Voluntary	NO	YES
TCVN 11707:2016	Trenchless applications of ductile iron pipes systems – Product design and installation	ISO 13470:2012	2016	Voluntary	NO	YES
TCVN 11703:2016	Design method for ductile iron pipes	ISO 10803:2011	2016	Voluntary	NO	YES
TCVN 11704:2016	Restrained joint systems for ductile iron pipelines – Design rules and type testing	ISO 10804:2010	2016	Voluntary	NO	YES
TCVN 2055:1977	Seamless hot-rolled steel tubes - Sizes, measurements		1977	Voluntary	NO	YES
TCVN 2056:1977	Seamless cold-drawn and hot-rolled steel tubes - Sizes, parameters and dimensions		1977	Voluntary	NO	YES
TCVN 2981:1979	Steel pipes and fittings for water piping - Seam steel pipes and fittings - Basic dimensions		1979	Voluntary	NO	YES
TCVN 5894:1995	Steel tubes - Tolerance systems	ISO 5252:1991	1995	Voluntary	NO	YES
TCVN 7698-1:2007	Steel tubes and fittings - Symbols for use in specifications - Part 1: Tubes and tubular accessories with circular cross-section	ISO 3545-1:1989	2007	Voluntary	NO	YES
TCVN 7698-2:2007	Steel tubes and fittings - Symbols for use in specifications - part 2: square and rectangular hollow sections	ISO 3545-2:1989	2007	Voluntary	NO	YES
TCVN 7698-3:2007	Steel tubes and fittings - Symbols for use in specifications - part 3: tubular fittings with circular cross-section	ISO 3545-3:1989	2007	Voluntary	NO	YES
TCVN 7702:2007	Stainless steel tubes - dimensions, tolerances and conventional masses per unit length	ISO 1127:1992	2007	Voluntary	NO	YES

TCVN 6113:1996	Seamless and welded (except submerged arc - welded) steel tubes for pressure purposes- full peripheral ultrasonic testing for the detection of longitudinal imperfections	ISO 9303 : 1989	1996	Voluntary	NO	YES
TCVN 6114:1996	Seamless steel tubes for pressure purposes - Full peripheral ultrasonic testing for the detection of transverse imperfections	ISO 9305 : 1989	1996	Voluntary	NO	YES
TCVN 6116:1996	Electric resistance and induction welded steel tubes for pressure purposes - Ultrasonic testing of the weld seam for the detection of longitudinal imperfections	ISO 9764 : 1989	1996	Voluntary	NO	YES
TCVN 8888:2011	Carbon steel tubes suitable for screwing in accordance with TCVN 7701-1 (ISO 7-1)	ISO 65:1981	2011	Voluntary	NO	YES
TCVN 8921:2012	Welded steel tubes for pressure purposes - Ultrasonic testing of the area adjacent to the weld seam for the detection of laminar imperfections	ISO 10893-9:2011	2012	Voluntary	NO	YES
TCVN 9833:2013	Stainless steel tubes for the food industry	ISO 2037:1992	2013	Voluntary	NO	YES
TCVN 9837:2013	Non-alloy and alloy steel butt-welding fittings	ISO 3419:1981	2013	Voluntary	NO	YES
TCVN 9838:2013	Pipework - Stainless steel fittings threaded in accordance with TCVN 7701-1 (ISO 7-1)	ISO 4144:2003	2013	Voluntary	NO	YES
TCVN 9839:2013	Plain end steel tubes, welded and seamless - General tables of dimensions and masses per unit length	ISO 4200:1991	2013	Voluntary	NO	YES
TCVN 9840:2013	Stainless steel butt-welding fittings	ISO 5251:1981	2013	Voluntary	NO	YES
TCVN 9841:2013	Stainless steel tubes suitable for screwing in accordance with TCVN 7701-1 (ISO 7-1)	ISO 7598:1988	2013	Voluntary	NO	YES
TCVN 11221:2015	Steel tubes for water and sewage	ISO 559:1991	2015	Voluntary	NO	YES
TCVN 11222:2015	Plain end seamless precision steel tubes -- Technical conditions for delivery	ISO 3304:1985	2015	Voluntary	NO	YES
TCVN 11223:2015	Plain end welded precision steel tubes -- Technical conditions for delivery	ISO 3305:1985	2015	Voluntary	NO	YES
TCVN 11224:2015	Plain end as-welded and sized precision steel tubes -- Technical conditions for delivery	ISO 3306:1985	2015	Voluntary	NO	YES
TCVN 11225:2015	Steel tubes -- Preparation of ends of tubes and fittings for welding	ISO 6761:1984	2015	Voluntary	NO	YES
TCVN 11226:2015	Steel tubes -- Continuous character marking and color coding for material identification	ISO 9095:1990	2015	Voluntary	NO	YES
TCVN 9113:2012	Reinforced concrete pipes for water draining	TCXDVN 372:2006	2012	Voluntary	NO	YES
TCVN 10799:2015	Precast concrete support blocks		2015	Voluntary	NO	YES

**Table 4.3 Vietnam Technical Regulations – Water Treatment Technologies**

National regulation reference number	National regulation title	International Standard Reference	Year 1st Adopted	Status	Product included in a <u>mandatory</u> quality mark scheme?	Product included in a <u>voluntary</u> quality mark scheme?
TCVN 11978:2017	Household water purifier		2017	Voluntary	NO	YES
TCVN 11979:2017	Testing methods for household water purifiers		2017	Voluntary	NO	YES

## CONCLUSION

Approximately 27% of U.S. plumbing exports outside of North America are sent to Asia. ASEAN represents an enormous market opportunity for the plumbing industry in the near and long term. This opportunity is further magnified by the region’s growing middle class, increasing disposable incomes and a continuing focus on infrastructure.

Tremendous progress has been made in aligning market access requirements in the region. The success to date has largely come from the successful adoption of national plumbing codes that referenced industry-developed international standards. With the addition of the United States, the national plumbing codes of Indonesia, Philippines and Vietnam collectively reference more than 458 of these international standards. Two countries or more reference 214 of the same international standards, which presents a unique opportunity for future alignment. Successful initiatives in this area have been industry-led and have greatly benefited from partnerships with U.S. government agencies and ministries in ASEAN member economies. More collaboration between public and private stakeholders will be essential to continuing to grow trade, remove technical barriers, and increase opportunities for international manufacturers and U.S. exporters.

The opportunity presented to the U.S. plumbing industry in ASEAN is not without threats. ASEAN is at a critical stage in the development of its regulatory frameworks for water and sanitation systems. This is highlighted by the fact that Indonesia and the Philippines have largely based their technical regulations for plumbing fittings and fixtures on industry-developed international standards, while Vietnam has largely turned to European international standards. Without coordinated action there is a risk of increased fragmentation among ASEAN markets, increasing the potential costs and technical barriers faced by exporters. However, many of these technical regulations are not mandatory yet. Today, there is an opportunity to shape and align market access requirements across the region and with the U.S. before regulations and conformity assessment requirements become too firmly entrenched in this sector.

Plumbing is central to the provision of water and sanitation services. However, inefficient and unsafe products crowd the marketplaces. Growth of the plumbing industry and trade in this region are hampered by incomplete regulatory schemes that make enforcement impossible. Future market development work should focus on adopting industry-developed international standards into technical regulations and then including those technical regulations into voluntary or mandatory certification schemes. This definition of the plumbing market’s technical regulations and certification schemes is essential to increasing the competitiveness of quality products, including U.S. exports.

Finally, particular attention should be paid to water efficiency and water quality. Plumbing standards are essential to meeting the region's needs in these two arenas and by extension achieving national sustainability and disaster resiliency goals. Water-efficiency requirements have rarely been adopted and enforced, despite growing populations, increased urbanization, and rising water stresses across the region. Ensuring water quality is a challenge throughout the region. In the built environment, these efforts are hampered by 1) insufficient technical regulations on water system components; and 2) limited regulatory requirements for water treatment technologies (e.g., point-of-use/point-of-entry systems). It is important to note that the technical regulations on water treatment technologies that were identified as part of this effort were based exclusively on industry-developed international standards. The U.S. has an opportunity to share technologies, research and best practices to help meet national water-efficiency and water quality goals. This, in turn, will help the region further develop smart cities and meet other national priorities.