2024

Vietnamese Perspective on Plumbing Engineering: Codes, Myths, and US Experiences

World Plumbing Council Developing Countries Scholarship 2023 Report

Nhat Nguyen

Table of Contents

ACKNOWLEDGEMENT

I would like to extend my sincere thanks to Mr. David W. Viola, Chair of World Plumbing Council, and WPC Executive Board, for awarding me this scholarship and change my life significantly. This scholarship is a dream of every plumbing engineer worldwide, and my life has significantly changed since I received your acceptance letter.

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I wish to show my thankfulness to Mr. Zachery Vetter for his warm welcome during my visit to his house, and Mr. Larry Weingarten whose kindness I will never forget. Also thanks to Ms. Victoria A. Dengel, Executive Director of the General Society of Mechanics & Tradesmen of the City of New York, for allowing me to visit Mr. Larry's water heater collection in New York and tour me around the entire museum.

Thanks to Ms. Brandi Pine from Walsh Construction for a great tour of the Fairfield Apartments site, and Mr. Eric Walczyk for the tour of the Portland International Airport construction site. From these tours, I learned that the work attitude is the most important thing that helps to maintain high safety level during construction works.

Further thanks to Mr. Leon M. Perkolaj, P.E., Director of Plumbing & Fire Protection Engineering at MG Engineering, D.P.C. Despite his busy schedule, he gave me an insightful tour of a construction in Brooklyn and taught me about the complexity of the standards system in New York City. I also enjoyed the most fun lunch of my US trip with him.

My gratitude goes to Ms. Kelley Lundquist and her team for the great visit to PAE office in San Francisco, California; Mr. Robb A Risani, Associate Principal - Plumbing and Fire Protection, Mr. Esteban Roldan, PE, CPD, and Mr. Anthony Mun for a wonderful visit to the Arup office in New York City. I learned a lot from you about improving the quality of design.

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I am grateful to my wife and my son for their unwavering support in taking this opportunity. I love them so much. Four weeks is a long time to be apart, but I hope this hope this report's contribution the community will serve as a gift to them, making up for the time spent away.

Finally, I would like to extend my appreciation to everyone who support my trip silently, whose names I may not know but whose efforts I deeply value.

PART 1: FROM VIETNAMESE PLUMBING CODE TO 2024 UNIFORM PLUMBING CODE

The Vietnamese Plumbing Code was adopted from the Uniform Plumbing Code (1997 edition) in 2000, and it has remained unchanged since then.

The purpose of this section is to list significant updates in the 2024 Uniform Plumbing Code, compared to the Vietnamese Plumbing Code. These updates directly impact not only the design phase but also the acceptant of construction.

The table also includes notes for more convenient follow-up and descriptions of the differences between common practices in the US and Vietnam, which is also following various Russian / EU theories and standards.

All comments on the clauses in the table can be found in the 2024 Uniform Plumbing Code – Illustrated Training Manual, available on the IAPMO online store.

Please refer to Appendix A for the table describing the differences between the Vietnamese Plumbing Code and the 2024 Uniform Plumbing Code.

PART 2: PLUMBING ENGINEERING IN VIETNAM: MYTHS AND FACTS

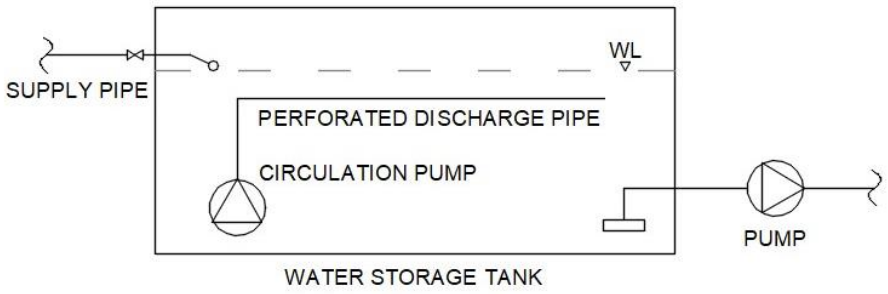
This section will describe various myths and facts found by the author in many projects up to now. For convenience in reference, these issues will be classified into three different categories: plumbing system, drainage system, and fire protection system.

I. Plumbing System

1. **Myth: Water Tank Capacity: Bigger is Better!** Due to the low reliability of the infrastructure network in Vietnam, water storage tanks are common practice for buildings, especially in urban area. Many engineers believe that a larger tank capacity is better for water supply system, so they try to maximize the capacity of water tank as much as possible.

   Fact: According to CIBSE Guide G, long stagnation of water in tanks can lead to the growth of harmful bacterial. This guide also suggests periodic storage (from 0-50% of daily demand) to prevent the development of bacterial contamination[1].

   Further discussion: In case where the project requires a tank capacity beyond the guideline to cover interruptions in the infrastructure network, it is crucial to implement strategies to reduce contamination risk in a large tank. Some projects install submersible pumps to circulate water in the tank, ensuring consistent water movement and minimizing stagnation. Additionally, supply point should be located opposite the suction points based on the tank's shapes to promote effective water flow. Computational Fluid Dynamics (CFD) software should be applied to visualize and optimize the effectiveness of these designs, ensuring proper circulation and minimizing contamination risk.



(Arrangement to reduce water stagnation in the storage tank)

2. **Myth: Water Temperature Control is Only for Hot Water Systems.** The stability of water temperature in cold water systems hasn't been sufficiently considered.

   Fact: Roof water tanks made of stainless steel in cold water supply systems are common in Vietnam. These tanks are installed outdoors, so the

temperature of water in the tanks will be significantly affected by the air temperature, impacting guest satisfaction, especially in hot summer days.

Further discussion: There are some guidelines from Hotels Operator require the control of cold-water temperature. For example, Accor Technical Standard requires the temperature of cold water in the system is below 16°C (61°F)[2]. However, the method to achieve these require is still not to be mentioned.

3. **Myth: Pump Calculation: Finding the Duty Point (Flowrate, Head) is Enough!** In many projects in Vietnam, pumps are only calculated to archive the pump's duty point in the design process. This point is then used to purchase the pump.

   Fact: NPSH (Net Positive Suction Head) is another important aspect of pumps. Pumps operating in suction-lift conditions are common in water supply systems. Furthermore, NPSH values are often overlooked when the initial water level in tanks is higher than pumps suction line. In addition to NPSH calculation, the IP rating is another factor often chosen incorrectly in the selection process. Please refer ANSI/HI standards[3] for more information about NPSH value.

4. **Myth: Pump Curve: If Needed, We Can Extend the Pump Curve Manually.** Pump curves produced by pump manufacturers always end at a specific flowrate. In the design process, many engineer try to extrapolate the pump curve to find the intersection of a pump curve and a system curve.

   Fact: We Cannot Extrapolate a Pump Curve Beyond the Range Provided by Pump Manufacturers. The reason is that pumps will operate incorrectly outside that range. Besides, engineers should not design a pumping system where the duty point falls outside the recommended range on a pump curve. Please refer ANSI/HI standards[4] for allowable operating region of pumps.

5. **Myth: Water Supply Pipe Sizing: Bigger is Better!** It is evident that too small pipe size will cause many problems in the water supply systems, such as increased pressure loss leading to the need for higher pump capacity, leakage, noise and vibration due to high water velocity. Faced with these risks, plumbing engineers tend to oversize the water supply pipes in their projects. This may seem appropriate because they believe it only increasing the initial cost. In the worst case, if clients detect the oversizing, it is easier to reduce the pipe size, which reduce the cost of the tender packet compared to increasing the pipe size.

   Fact: Oversizing Water Supply Pipes Could Harm the System, not only increasing cost but also posing a potential risk of contamination because it reduces the water velocity in the system. As a result, water remain in the pipeline for an extended period, promoting an environment more suitable for waterborne pathogens[5].

6. **Myth: Requirement of Velocity is a Unique Number.** Engineers following the Uniform Plumbing Code will find that the water velocity in supply pipes shall not exceed 1.5 m/s (5 ft/s) for hot water and 2.4 m/s (8 ft/s) for cold water in copper tube systems[6]. For other pipe material, the maximum velocity in pipes is 3 m/s (10 ft/s)[7]. This value becomes a limiting factor when designing water supply pipes.

   Fact: Unlike the UPC requirement, TCVN 4513 has several ranges of velocity that vary depending on the function of pipes (branch pipes, Main pipes, discharge pipes, suction pipes)[8]. Additionally, there is another term: **economic velocity**, which is a range applied for infrastructure networks[9]. Economic velocity theory is adopted from a study in the Soviet Union.

7. **Myth: Water Hammer is a Physic Force.** Therefore, when water hammer occurs, it only affects points where the flow change direction such as bends, tees, or accessories that interferes with water flow, such as check vales or pump blade. With this misunderstanding, many engineers place elbows with rubber membranes inside at points where the flow changes direction to eliminate the water hammer force. They also focus only on the pump system.

   Fact: Water Hammer is a Sonic Wave. Therefore, it affects not only specific points or devices but also the entire system. The appropriate design involves placing water hammer arrestors near potential devices that could cause water hammer, such as quick closing vale and flush valve, to dissipate the effects of the wave as soon as possible[10].

8. **Myth: Double Check Valve is Equal to Two Separate Non-Return Valves.** Many engineers think that double check valve is a set including two check valves. This installation is intended as a backup in case one valve is broken; the remaining valve will operate to cover that broken valve.

   Fact: A Double Check Valve is a Backflow Prevention Device Used to Prevent Cross-Contamination. It is different from a check valve, which only directs the flow.

9. **Myth: Hot Water Insulation: Concrete Wall is a Natural Insulation Layer.** There is no insulation for hot water pipes run inside concrete/masonry walls because these walls are types of insulation.

   Fact: There is no Evidence That Walls Have the Ability to Act as an Insulation Layer. Moreover, in actual buildings, hot water in the buried pipe part cools faster than that in exposed pipes/flexible pipes due to the lower temperature inside the wall. The concrete absorbs the heat energy from the pipe, which has the effect of cooling the pipe.

10. **Myth: Maintain Hot Water Temperature in the Pipe: Just similar to the Required Temperature at the Fixture Outlet is sufficient!** The highest required temperature is 45 deg. C for sink, shaving[11].

    Fact: The Ambient Temperature of Water in the System has to be Higher than the Outlet Temperature Requirement to Avoid the Development of Bacteria. Many standards require maintaining the minimum water temperature in the pipe at 50 deg. C[12].

11. **Myth: Hot Water Return Pipe Sizing: One-Time Calculation is Enough.** It is common practice in Vietnam that the return pipe is one size smaller than the supply pipe. The circulation pump is then calculated based on these pipe sizes without rechecks.

    Fact: Return Pipe Sizing is a Loop Calculation Process. Please refer to the Product Ratio Method for more information[13].

II. Drainage System

1. **Myth: There is Only One Drainage System in the World. Blackwater Must be Collected Separately from Greywater.**

   Fact: According to BS EN 12056 Part 2, there are At Least Four Drainage Systems. In the first three types, blackwater and greywater are collected in a common drainage pipe, which is largely used in the EU and the US. Type 4, however, is common in Vietnam and France[14].

2. **Myth: Drainage Pipe Size: Bigger is Better!** Many engineers believe that clogging is mainly due to inadequate drainage pipe size. As a result, they often size the pipe bigger than necessary as a safety factor.

   Fact: Oversizing pipes for a Small Number of Fixtures Could Cause Blockage Over Time. Pipes that are too big compared to the Drainage Fixture Unit (DFU) value could result in velocities below the self-cleansing velocity, leading to residue build up and eventual blockage.

3. **Myth: Self-Cleansing Velocity: 1/D is Enough.** While selecting the pipe, many engineers design the slope of the pipe as 1/D and believe it is sufficient for self-cleansing conditions.

   Fact: Pipe Slope is Just One of Three Aspects that Help Achieve Self-Cleansing Conditions. The diameter and roughness of the pipe are also important factors. Interestingly, while self-cleansing velocity is common in Vietnam, it is not mentioned in the UPC. N.F. Fedorov's formula is one of the most popular formulas used to calculate self-cleansing velocity in Vietnam[15].

4. **Myth: Velocity Breaker: Must-Have Item for Drainage System in High-Rise Buildings.** Without it, wastewater will damage pipes and fittings at the base of the stack due to its high velocity.

   Fact: Velocity Breaker is Unnecessary Item in Drainage System Because Water Will Reach Terminal Velocity in the Stack[16]. Additionally, Experimental tests and actual buildings have shown that velocity breakers cause noise and vibration in drainage systems[17].

   Further discussion: Care should be taken when using terminal velocity formula in ASPE manual volume 2, because it was built based on cast iron pipe. For other pipe's materials, constant in the formula will change significantly[18].

5. **Myth: Venting in Drainage Systems is to Direct Odor Gases Outside the Building.**

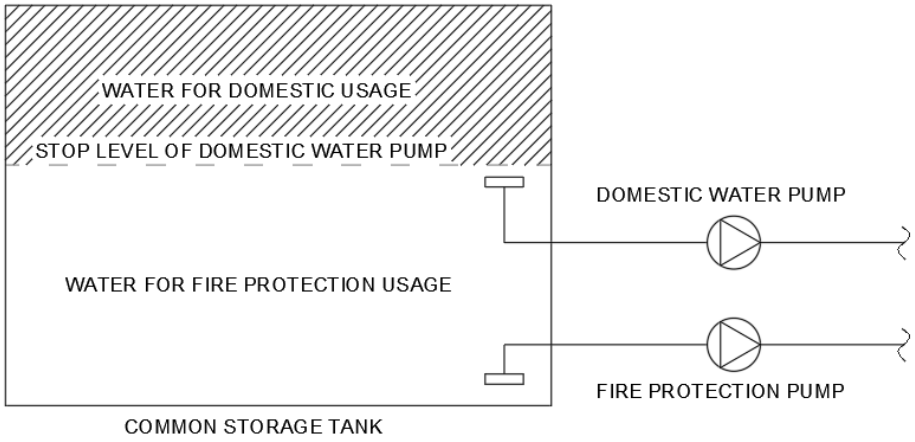
   Fact: The Vent System is Designed to Limit Air Pressure Within the Drain[19]. Misunderstanding the main function of the vent system has led to the incorrect venting designs in Vietnam. Many traps in drainage systems are not vented, as connections between vent systems and drainage systems are only made at the highest point of the drain line. Another mistake is connecting vent pipes for greywater and blackwater beneath the floor, creating cross-flow under the fixtures. Additionally, there are no relief vents in the offsets, which can create issue maintaining pressure differentials within the system.

III. Fire Protection system

1. **Myth: Sprinkler head placement: Denser is safer!** Many engineers try to reduce the distance between sprinkler heads in some important rooms and areas of the project to improve the safety in those areas. They believe that denser placement only affects to the cost of the system but enhances reliability.

   Fact: Placing sprinkler head too densely can cause the "sprinkler skipping" phenomenon. This occurs when water from initial activated sprinkler heads reach to other adjacent sprinkler heads, preventing them from activating. As a result, not enough sprinkler heads are activated to suppress the fire effectively in the early stage of a fire event[20].

2. **Myth: Combining domestic water storage tank and fire protection water tank is an efficient design to save space!** To ensure the domestic water pump doesn't draw from the fire protection water supply, the suction line of these pumps will be raised to a high level in the common storage tank as described in the following diagram.



(Common water storage tank and pumps arrangement)

Fact: The design is unreliable for two main reasons:

- Domestic water tank needs to be maintained regularly. During this time, the tank must be completely emptied, which would also shut down the operation of the fire protection system since they share a common storage tank.
- The above arrangement only guarantees that the domestic water pump cannot use water intended for the fire protection system. However, the design doesn't prevent the fire protection pumps from using water for domestic purposes. This is a critical risk because, during the fire, the domestic water system needs to operate normally to support various safety activities such as wetting clothes for smoke mask making or sealing door gaps to prevent smoke infiltration.

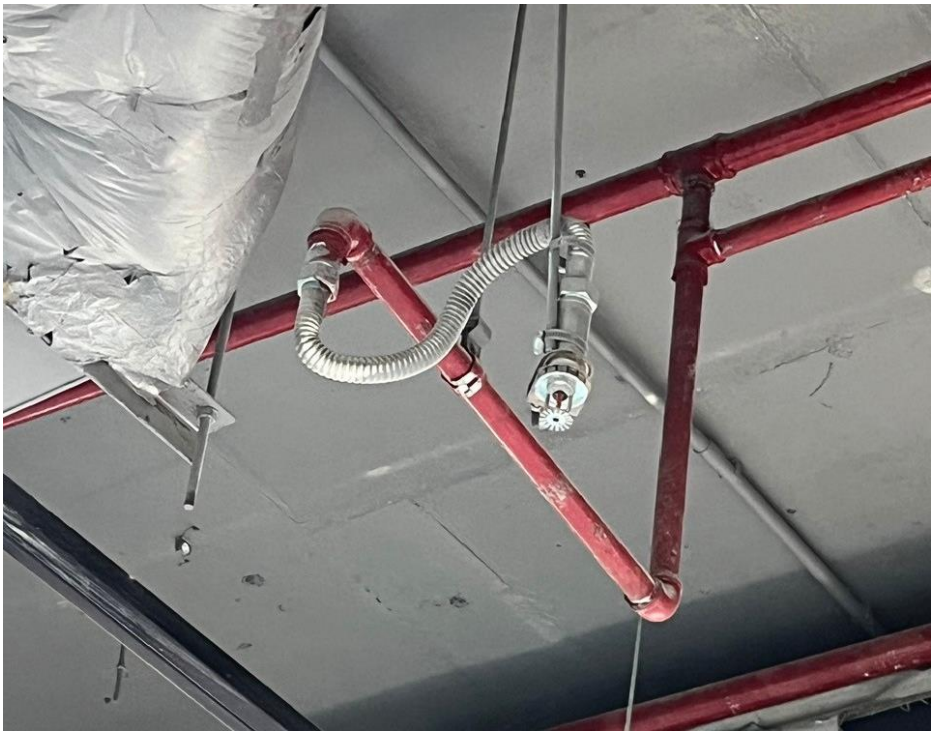
(In case of fire, domestic water system plays an important role)[21]

(Wet clothes for smoke infiltration)[22]

3. **Myth: Area limitation in NFPA13 is a requirement for the alarm valve set.** When designing projects following NFPA standards, many engineers believe that NFPA 13 requires an area limitation for the alarm valve, similar to Vietnamese standard (TCVN 7336) which requires a maximum number of sprinkler heads for each alarm valve set.

   Fact: Except in dry systems, the area limitation requirement in the NFPA standard is for the floor control valve, not for the alarm valve. Refer clause 4.5 and 16.9.11 in NFPA 13-2019 edition for more information.

4. **Myth: Flexible Sprinkler Hose: Flexible means we can bend it as much as we want.** Due to the flexibility of the flexible sprinkler hose, they have become more popular in projects in Vietnam. Many plumbers believe that when installing flexible sprinkler hoses, they can bend them as long as the bend doesn't damage the hoses.



(A flexible sprinkler hose was improperly bent in a mall in Vietnam)

Fact: There are limitations on not only the number of bends but also the maximum bend radius. These limitations are provided to ensure the reliability of hoses and to control the friction loss through the hose. The information of these limitations varies among hoses manufacturers and is usually described in the product catalog. Following these guidelines is essential for proper installation and functionality.

TECHNICAL DETAILS FOR BRAIDED FLEXIBLE DROP :

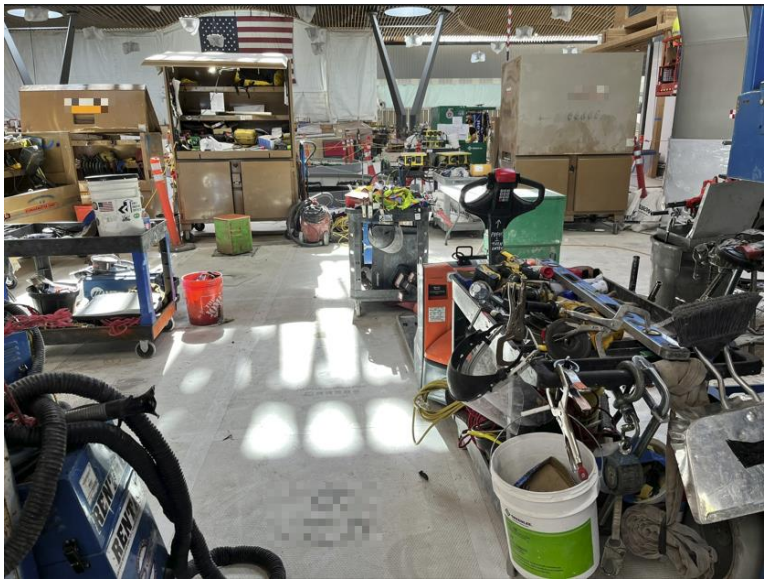
Model	Rated Pressure psig		Max. Ambient Temp.°F	Nominal Inlet X Outlet Size, In.	Assembly Length, ft. (mm)	Max. No. of 90° Bends		Min. Bend Radius in.		Equivalent Length of 1 in. Schedule, 40 Steel Pipe, ft	
	UL	FM				UL	FM	UL	FM	UL	FM
HD-28B-700 Braided	200	175	225	1x1/2	2.3 (700)	3	1	3	9	18	22.9
HD-28B-1000 Braided	200	175	225	1x1/2	3.3 (1000)	5	2	3	9	23	34.6
HD-28B-1200 Braided	200	175	225	1x1/2	3.9 (1200)	7	3	3	9	29	41.0
HD-28B-1500 Braided	200	175	225	1x1/2	4.9 (1500)	9	4	3	9	39	50.4
HD-28B-1800 Braided	200	175	225	1x1/2	5.9 (1800)	12	4	3	9	50	58.5
HD-28B-700 Braided	200	175	225	1x3/4	2.3 (700)	3	1	3	9	20	15.7
HD-28B-1000 Braided	200	175	225	1x3/4	3.3 (1000)	5	2	3	9	24	26.9
HD-28B-1200 Braided	200	175	225	1x3/4	3.9 (1200)	7	3	3	9	31	34.8
HD-28B-1500 Braided	200	175	225	1x3/4	4.9 (1500)	9	4	3	9	40	43.8
HD-28B-1800 Braided	200	175	225	1x3/4	5.9 (1800)	12	4	3	9	70	53.4

(Example of how the limitations are usually described in the catalog)[23]

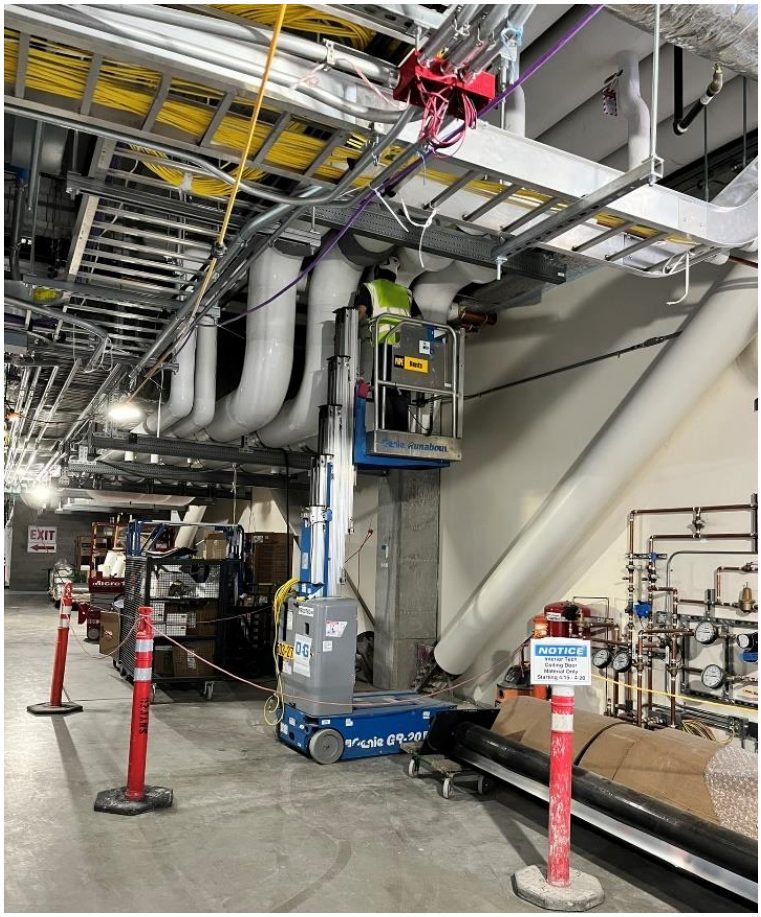
PART 3: AMERICA TRIP, IN SEARCH OF THE DEVELOPED PLUMBING SYSTEM

The initial intent of this section was to describe how modern practices on construction sites in the US could be applied to improve safety on construction sites in Vietnam. However, after several trips to construction sites in Portland and Brooklyn, I realized that the equipment and construction tool kits in the US are not too different from those in Vietnam. These differences, if any, are due to the differences in pipe types used between the two countries.

(Fairfield Apartments site, Portland, Oregon: Equipment and the Plumber)



(Portland International Airport site. Equipment storage area)



(Portland International Airport site. A plumber is working with the construction lift)

(Fairfield Apartments site, Portland, Oregon.
From left to right: Mr. John S. Lansing, Nhat Nguyen, Ms. Brandi Pine)

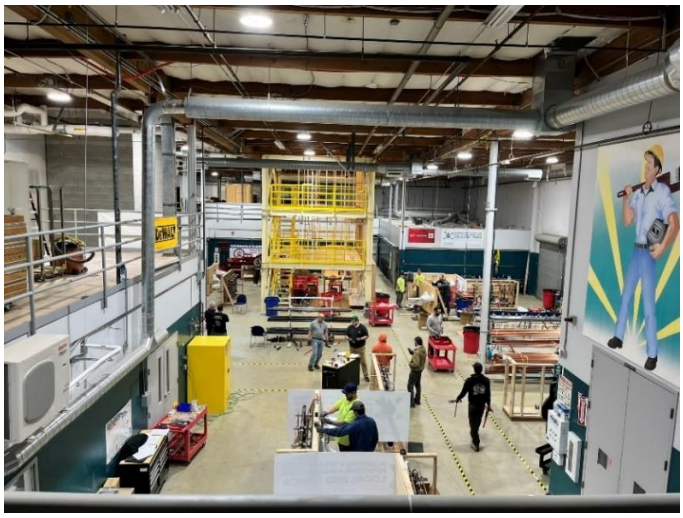
In the US, copper pipes and PEX pipes are used for the water supply system, while cast-iron pipes, ABS pipes, and PVC pipes are used for the drainage system. In Vietnam, PPR pipes and stainless-steel pipes, and HDPE pipes are used for the water supply system, besides, uPVC pipes and HDPE pipes are used for the drainage system. There are no robots or computerized safety systems to support plumbers on construction sites in the US, as the author initially imagined (this is another myth and fact). All safety measures come from the attitude and awareness of people in their work.

(Portland International Airport. From left to right: Nhat Nguyen, Mr. Eric Walczyk)

Therefore, in this part, I will describe my experiences from my trip across the US, from the West Coast to the East Coast. I hope this will provide a general overview of the current state of the plumbing field in the US. I also hope that some of the ideas and practices I observed can be applied to the development of plumbing field in Vietnam.

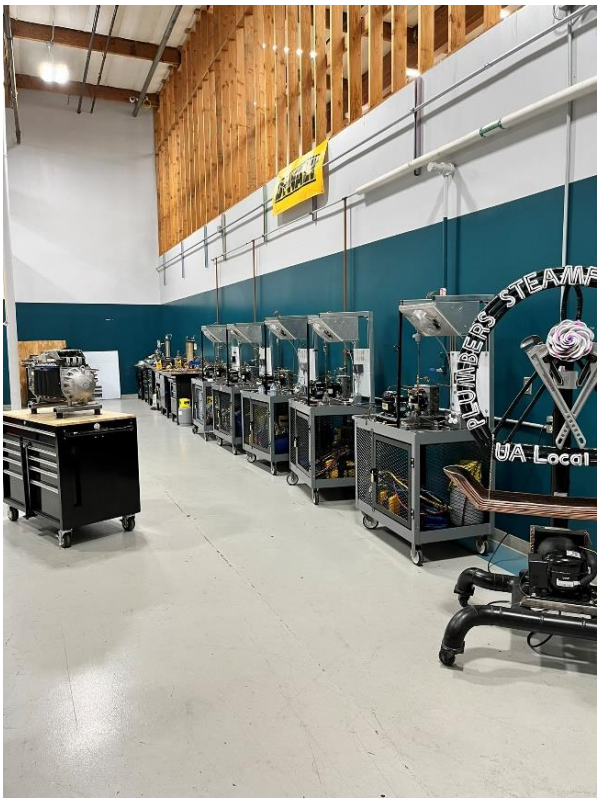
1. **United Association (UA): An excellent playground for the Plumbers in the US and Canada**

   Unlike plumbers in Vietnam, who are trained directly on-site. Plumbers in the US and Canada have more than 300 UA Local Training Centers when they can learn and practice their skills before starting their job. I visited UA Local 290 in Oregon, and after the visit, I believe that training centre is a dreamland of every plumber in the world. There are numerous training rooms equipped with various tests and equipment for plumbers to practice.



(One of training rooms in the UA Local 290)

(An installation exercise for plumbers in the UA Local 290)



(Not only plumbing system but other systems such as HVAC, Steam are also trained)

UA also organizes competition, from local competitions to the International Apprentice Contest, with attractive prizes to encourage plumbers try the best to enhance their skill. This approach significantly reduces mistakes and errors in the installation of plumbing systems on actual sites. Surprisingly, UA is not a government association but trade union. In my opinion, Vietnamese government, the Ministry of Construction and other groups in Vietnam could help create a similar playground for the plumbers to improve the quality of Plumbing field in Vietnam.

(UA Local 290 Center's logos)

2. International Association of Plumbing and Mechanical Officers (IAPMO)

(The IAPMO Group, World Headquarters – West)

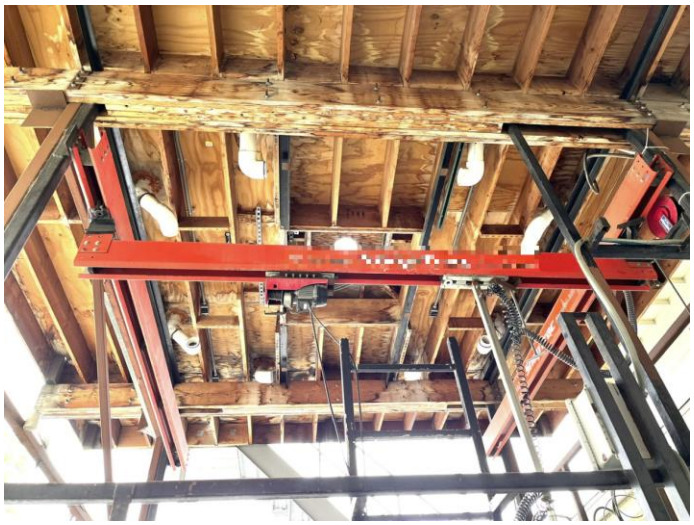
Unlike the United Association, which is unfamiliar for most Vietnamese plumbers, IAPMO is a well-known organization among many engineers in Vietnam. However, what surprised me the most was their Laboratory Department. During my US trip, I had a chance to visit the Lab in Ontario.

(The IAPMO Group, World Headquarters-East.
From left to right: Nhat Nguyen, Mr. Ken Wijaya)

There is an impressive array of testing equipment for every plumbing fixture, from small items like floor drains to large items such as an entire siphonic drainage system. The lab ensures the quality of the products before they are introduced to the market. It also

supports the development of codes and standards to keep pace with the advancements sanitary wares, thereby improving the quality of plumbing system design.

(Equipment for shower head testing at IAPMO Lab)

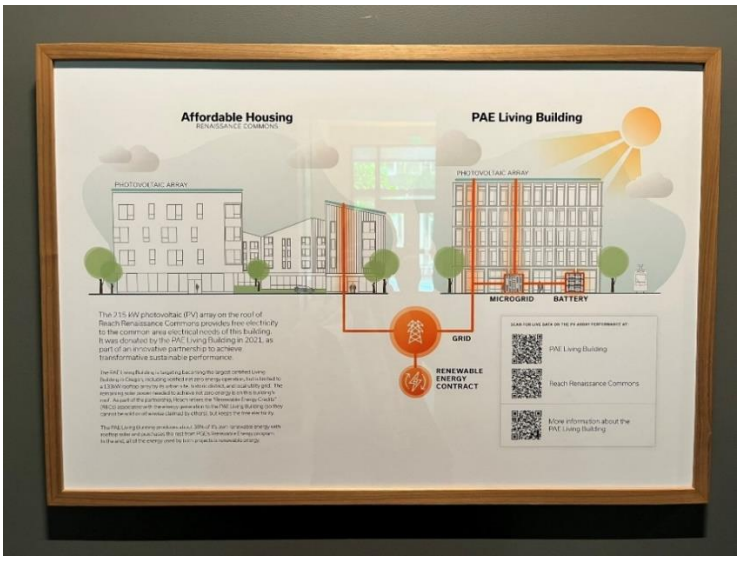


(Siphonic drainage system - test area)

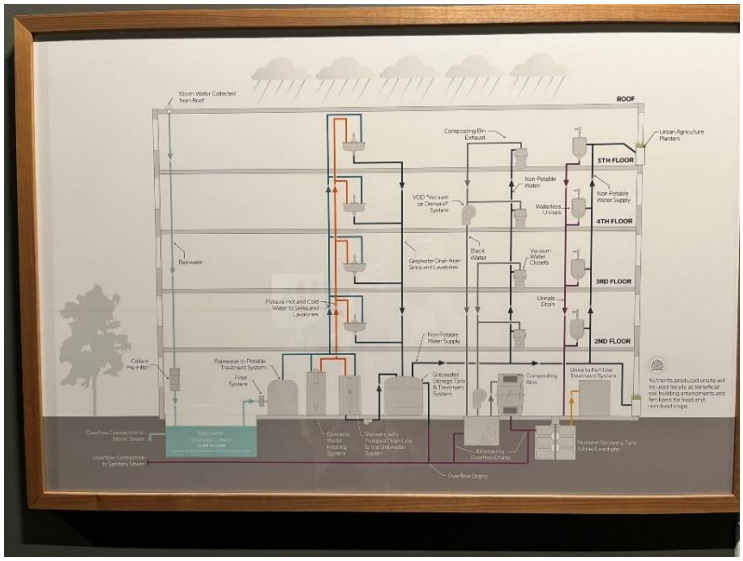
This lab is an excellent example of how to control the quality of plumbing fixtures in the market, making it easier for users to identify whether a product is guaranteed for its quality or not.

3. Environmental awareness among plumbing engineers in the US

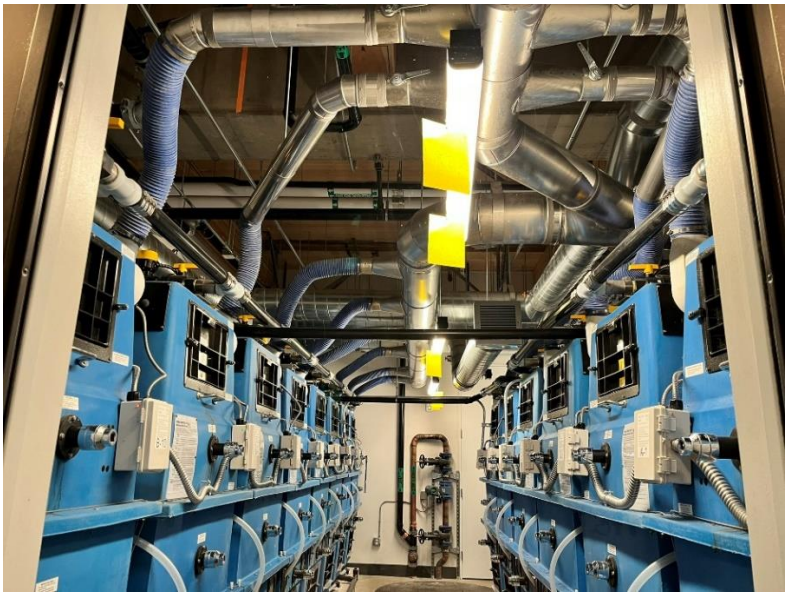
Many plumbing engineers in the US are highly concerned about the environment. When I met engineers from various consultant firms, I realized they are well-versed in conservative water plumbing fixtures and are also concerned about the environmental impact of cooling refrigerants used in the heat pump. I also visited the PAE Living Building in Portland, Oregon, a highly sustainable building. The building creates its own electricity from solar panels, reuses rainwater for water supply, and extracts nitrogen, phosphorus and potassium from urine wastewater to make fertilizers.



(PAE Living Building – Solar system diagram)



(PAE Living Building – Storm water and wastewater reuse diagram)



(PAE Living Building – Wastewater treatment plantroom)

(PAE Living Building – Final product from Wastewater treatment system)

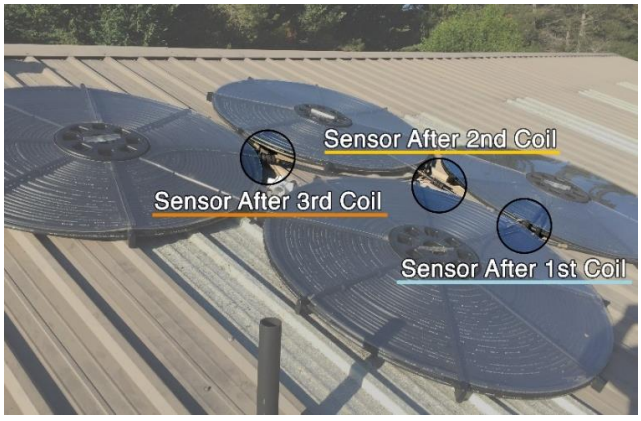
Clearly, engineers in Vietnam should embrace the concept of the green, sustainable design, and strive to apply it to their projects since sustainable development is crucial for the future of our planet.

4. Water system in rural areas in the US

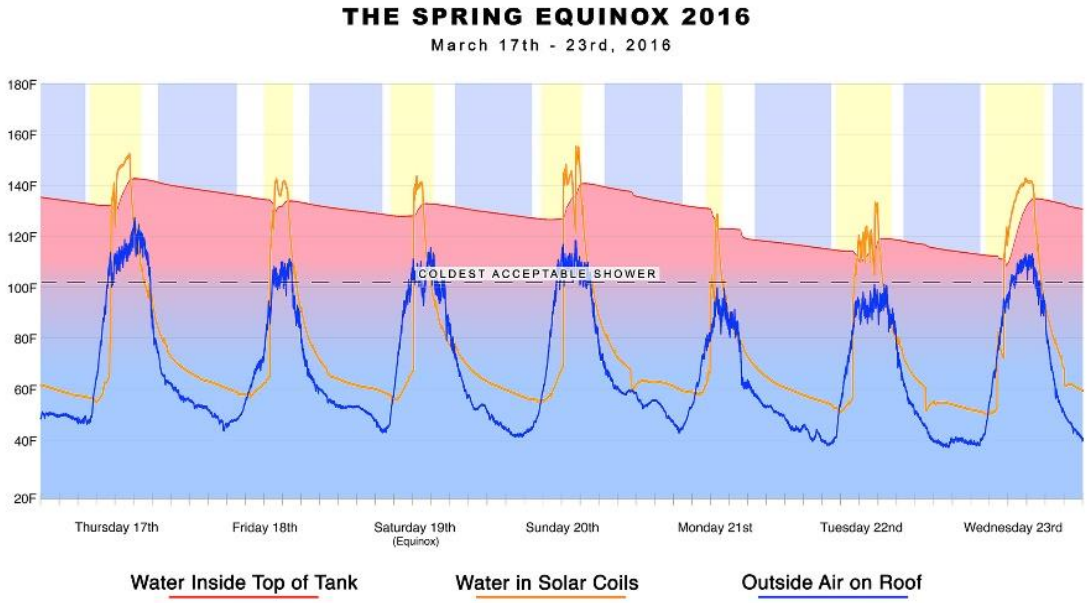
Despite being a highly developed country, America still has rural areas that lack an infrastructure water network. I had a great trip to visit a house in Camel Valley, California. Due to the absence of the infrastructure network, houses in this area use wells to pump underground water to storages tank. The system can also be found in many remote areas in Vietnam, including my hometown.

(Water supply system in Camel Valley with storage tanks and a well-pump station. From left to right: Mr. Zachery Vetter, Mr. Larry Weingarten)

However, what sets this apart is the hot water system. Inspired by Mr. Larry Weingarten's solar hot water system, which includes a coil made of HDPE pipe, and a hot water storage tank, home owner Mr Zachery Vetter installed a similar system in his house. He collected data and analysed the system's efficiency and sent water sample for quality test every two years. The results were impressive: the system operates properly, shows no evidence of Legionella bacteria, is safe and easy to use for older people, and is cost-effective compared to other hot water systems. This hot water system could be beneficially applied to other rural areas in Vietnam.



(Solar coils made of HDPE pipe on the roof with temperature sensors)



(Data is collected and analyzed in the hot water system by Mr. Zachery Vetter)

(Pumps and thermometers to control the system)[24]

5. Checklist: Underrated items in consultant firms in Vietnam

During my visit to several consultant firms in the US, I realized the critical role checklist plays in ensuring the quality of design. Unlike many companies in Vietnam that do not utilize checklists, they can begin implementing them. Checklists could include individual installation checklists for designers in specific departments to ensure thoroughness, as well as combined checklists for interdepartmental coordination purposes. This practice can significantly enhance the quality and consistency of designs in Vietnamese consultant firms.

(PAE office, San Francisco. From left to right: Ms. Kelley Lundquist, Mr. Nhat Nguyen)

(MG Engineering office, New York City.
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6. Sustainability in plumbing field: A goal for all

Achieving sustainability in the plumbing field is a goal that should involve individuals and associations, from engineers to manufacturers. Fortunately, I had the opportunity to attend the 2024 Emerging Water Technology Symposium (EWTS) in Scottsdale, Arizona. The EWTS featured various presentations highlighting advancements in technology and tools aimed at enhancing sustainability and safety in the water sector.

(The 2024 EWTS Conference room)

Some innovations could have significant applications in Vietnam, such as:

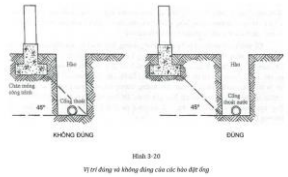
- Anti-legionella bacteria shower heads and other fixtures[25].
- A device that converts pressure differences in pipelines into electricity[26].
- A device that detects water leakage and improves water consumption efficiency by monitoring the water meter and other best management practices[27].
- Extract nitrogen, phosphorus and potassium from urine wastewater to make fertilizers [28].

APPENDIX A: DIFFERENCES BETWEEN THE VIETNAMESE PLUMBING CODE AND THE 2024 UNIFORM PLUMBING CODE

Note: The comparison is the author's and does not represent the position of IAPMO (author of the UPC) nor the WPC.

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
Chapter 3: General Regulations			
1	301.2.3 Plastic Pipe, Plastic Pipe Fittings and Components. Plastic pipe, plastic pipe fittings and components other than those for gas shall comply with NFS/ANSI 14.	N/A	
2	301.2.4 Cast-Iron Soil Pipe, Fittings, and Hubless Couplings. Cast-iron soil pipe, fittings and hubless couplings shall be third party certified in accordance with ASTM C1277 and CISPI 310 for couplings and ASTM A888, ASTM A74, and CISPI 301 for pipes and fittings.	N/A	
3	301.4 Flood Hazard Areas	N/A	
4	Removed	305.0 Sewers Required 305.1 Every building in which plumbing fixtures are installed shall have a connection to a public or private sewer except as provided in Section 305.2. 305.2 When a public sewer is not available for use, drainage piping from buildings and premises shall be connected to an approved private sewage disposal system. 305.3 In cities and / or counties, where the	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
		installation of building sewers is under the jurisdiction of a department other than the Administrative Authority, the provisions of this Code relating to building sewers need not apply.	
5	Removed	306.2 Roofs, inner courts, vent shafts, light wells or similar areas having rain water drain, shall discharge to the outside of the building or to the gutter and shall not be connected to the drainage system unless first approved by the Administrative Authority.	
6	309.5 Sound transmission. Plumbing piping systems shall be designed and installed in conformance with sound limitations as required in the building code		
7	309.6 Dead legs. Dead legs shall have a method of flushing		
8	310.1	311.1 No double hub fitting, single or double tee branch, single or double tapped tee branch, side inlet quarter bend, running thread, band, or saddle shall be used as a drainage fitting, except that a double hub sanitary tapped tee may be used on a vertical line as a fixture connection.	
9	310.9 Female Plastic Connection. Female plastic tapered (NPT) threaded connections shall not be allowed to be used when threaded onto a male metallic connection. Exception: Female plastic parallel (straight) threaded connections shall be permitted.	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
10	310.10 ABS and PVC Transition Joints. Except as provided in section 705.9, PVC and ABS pipe and fitting shall not be solvent welded to dissimilar material.	N/A	
11	Removed	313.3 All trenches deeper than the footing of any building or structure and paralleling the same shall be at least forty-five (45) degrees (0.79 rad) therefrom, unless permission be otherwise granted by the Administrative Authority	
12	3.12.9 Steel nail Plates. Plastic piping or tubing, and copper or copper alloy piping or tubing penetrating framing members to within 1 inch (25.4 mm) of the exposed framing shall be protected by steel nail plates not less than no.18 gauge (0.0478 inches) (1.2mm) in thickness. The steel nail plate shall extend along the framing member not less than 1 1/2 inches (38mm) beyond the outside diameter of the pipe or tubing. Fuel gas piping shall be protected in accordance with Section 1210.4.3.	313.9 Plastic and copper piping run through framing members to within one (1) inch (25.4 mm) of the exposed framing shall be protected by steel nail plates not less than 18 gauge.	
13	312.10 Sleeves. Sleeves shall be provided to protect piping through concrete and masonry walls, and concrete floors. Exception: Sleeves shall not be required where opening are drilled or bored.	313.10.1 Sleeves shall be provided to protect all piping through concrete or masonry exterior or bearing walls.	
14	Removed	313.10.2 Sleeves shall be sized so there is a minimum of one-half (1/2) inch (12.7 mm) clearance around the pipe and / or insulation.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
15	312.12.3 Tub Waste Openings. Tub waste openings in framed construction to crawl spaces at or below the first floor shall be protected by the installation of approved metal collars or metal screen securely fastened to the adjoining structure with no opening exceeding 1/2 of an inch (12.7mm) in the least dimension.	N/A	
16	313.1 General. Piping, tubing, fixtures, appliances, and appurtenances shall be supported in accordance with this code, the manufacturers installation instruction, and in accordance with the AHJ. Seismic restraints shall be in accordance with the building code.	N/A	
17	313.2 Material. Hangers, supports, and anchors shall be of sufficient strength to support the weight of the pipe or tubing and its contents. Piping or tubing shall be isolated from incompatible materials.	N/A	
18	table 313.3	table 3-2	add more pipe type: PEX, PP…
19	313.7 Gas Piping. Gas piping shall be supported by metal straps or hooks at intervals not to exceed those shown in Table 1210.3.5.1	314.7 All gas piping shall be supported by metal straps or hooks at intervals not to exceed those shown in Table 3-2.	New table for gas piping
20	314.1 Trenches. Trenches deeper than the footing of a building or structure, and paralleling the same, shall be located not less than 45 degrees (0.79 rad) from the bottom exterior edge of the footing, or as approved in accordance with Section 301.0	315.1 All trenches deeper than the footing of any building or structure and paralleling the same shall be at least forty-five (45) degrees (0.79 rad) therefrom, unless permission is otherwise granted by the Administrative Authority.	Similar to 313.3 of UPC 1997, but it has not been removed in UPC 2024 this time.

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
21	314.4.1 Installation of Thermoplastic Pipe and Fittings. Trench width for thermoplastic sewer pipe shall be not less than 1.25 times the outside diameter of the piping plus 12 inches (305mm) or the outside diameter of the piping plus not less than 16 inches (406mm). Thermoplastic piping shall be bedded in not less than 4 inches (102mm) of granular fill supporting the piping. The backfill for thermoplastic piping shall be compacted along the sides of the piping in 6 inches (152mm) layers and continue to not less than 12 inches (305mm) above the piping. Compaction shall be not less than an 85 percent standards proctor density.	N/A	
22	Removed	316.0 Joints and Connections 316.1 Types of Joints 316.1.1 Threaded Joints. 316.1.2 Wiped Joints. 316.1.3 Soldered Joints. 316.1.4 Flexible Compression Factory Fabricated Joints. 316.1.5 Solvent Cement Plastic Pipe Joints. 316.1.6 Brazing and Welding. 316.1.7 Pressure-Lock Type Connection 316.2 Special Joints 316.2.1 Copper Tubing to Screw Pipe Joints.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
23	315.1 Unions. Approved unions shall be permitted to be used in drainage piping where accessibly located in the trap seal or between a fixture and its trap; in the vent system, except underground or in wet vents; at any point in the water supply system; and in gas piping as permitted by Section 1212.6	316.2.2 Unions. Approved unions may be used in drainage work when accessibly located in the trap seal or between a fixture and its trap; in the vent system, except underground or in wet vents; at any point in the water supply system and in gas piping as permitted by Section 1211.10.	
24	Removed	316.2.3 Plastic Pipe to Other Materials. 316.3 Flanged Fixture Connections	
25	Removed	316.4.2 No fitting or connection that offers abnormal obstruction to flow shall be used. The enlargement of a three (3) inch (76 mm) closet bend or stub to four (4) inches (102 mm) shall not be considered an obstruction	
26	317.0 Food-Handling Establishments 317.1 General. Food or drink shall not be stored, prepared or displayed beneath soil or drainpipes unless those areas are protected against leakage or condensation from such pipes reaching the food or drink as described below. Where building design requires that soil or drain pipes be located over such areas, the installation shall be made with the least possible number of joints and shall be installed so as to connect to the nearest adequately sized vertical stack with the provision as follows:	318.0 Food Handling Establishments Food or drink shall not be stored, prepared or displayed beneath overhead soil or drain pipes, unless those areas are protected against leakage or condensation from such pipes reaching the food or drink as described below for new construction. Where building design requires that soil or drain pipes be located over such areas, the installation shall be made with the least possible number of joints and shall be installed so as to connect to a vertical stack at the nearest wall or vertical building support with the provisions as follows:	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
27	(1) Opening through floors over such areas shall be sealed watertight to the floor construction.	318.1 All openings through floors over such areas shall be provided with sleeves securely bonded to the floor construction and projecting not less than three-quarters (3/4) inch (19.1 mm) above top of the finished floor with space between sleeve and pipe or duct sealed.	
28	(2) Floor and shower drains installed above such areas shall be equipped with integral seepage pans.	318.2 Floor and shower drains installed above such areas shall be equipped with integral seepage pans.	Remained unchanged
29	Removed	318.3 Plumbing fixtures, except bath tubs, in rooms located above such areas shall be of the wall-mounted type. Tubs shall have waste and overflow connections made above floor and piped to the trap below the floor. Connections through floors and traps shall conform with all other provisions of this regulation. No floor openings, other than sleeves for waste pipe, will be permitted for tubs.	
30	(3) Soil or drainpipes shall be of an approved material as listed in chapter 17 and section 701.2. Materials shall comply with established standards. Cleanouts shall be extended through the floor construction above	318.4 All other soil or drain pipes shall be of an approved material as listed in Table 14-1 and Section 701.0. All materials shall conform to established standards. Cleanouts shall be extended through the floor construction above.	Remained unchanged (update chapter and section number)
31	Removed	318.5 Soil and drain pipes located above such areas shall be subjected to a standing water test of not less than twenty-five (25) feet (7620 mm).	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
32	(4) Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.	318.6 Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.	Remained unchanged
33	(5) Where pipes are installed in ceilings above such areas, the ceiling shall be of the removable type or shall be provided with access panels in order to form a ready access for inspection of piping.	318.7 Where pipes are installed in ceilings above such areas, the ceiling shall be of the removable type, or shall be provided with access panels in order to form a ready access for inspection of piping.	
34	Removed	318.8 In lieu of the above, any other method may be approved by the Administrative Authority.	
35	319.0 Medical Gas and Vacuum systems. 319.1 General. Such piping shall be in accordance with the requirements of Chapter 13. The AHJ shall require evidence of the competency of the installers and verifies.	N/A	
36	320.0 Rehabilitation of Piping Systems 320.1 General. Where the pressure piping systems are rehabilitated using an epoxy lining system, it shall be in accordance with ASTM F2831	N/A	
Chapter 4: Plumbing Fixtures and Fixture Fittings			
37	402.0 Installation.	408.0 Installation.	Change the order of section

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
38	404.0 Waste Fittings and Overflows. 404.1 Waste Fittings. Waste fittings shall comply with ASME A112.18.2/CSA B125.2, ASTM F409 or Table 701.2 for aboveground drainage piping and fittings. 404.2 Overflows. Where a fixture is provided with an overflow, the overflow shall comply with Section 404.2.1 or Section 404.2.2	404.0 Overflows When any fixture is provided with an overflow, the waste shall be so arranged that the standing water in the fixture cannot rise in the overflow when the stopper is closed or remain in the overflow when the fixture is empty. The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap, except that overflow on flush tanks may discharge into the water closets or urinals served by them, but it shall be unlawful to connect such overflows with any other part of the drainage system.	
39	407.3 Limitation of Hot Water Temperature for Public Lavatories. Hot water delivered from public-use lavatories shall be limited to a max. temp. of 120F(49C). The maximum temperature shall be regulated by one of the following means: (1) A limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70, or (2) A water heater conforming to ASSE 1084	N/A	
40	407.5 Waste Outlet. Lavatories shall have a waste outlet and fixture tailpiece not less than 1 1/2 inches (32 mm) in diameter. Continuous wastes and fixture tailpieces shall be constructed from the materials specified in Section 701.4. Waste outlet shall be provided with an approved stopper or strainer.	N/A	
41	409.0 Bathtubs and Whirlpool Bathtubs.	N/A	
42	412.1.1 Nonwater Urinals	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
43	412.1.2 Nonwater Urinals with Drain Cleansing	N/A	
44	Removed	411.5 Flush Valves in Flush Tanks. Flush valve seats in tanks for flushing water closets shall be at least one (1) inch (25.4 mm) above the flood level rim of the bowl connected thereto, except in approved water closet and flush tank combinations designed so that when the tank is flushed and the fixture is dogged or partially clogged, the flush valve closes tightly so that water does not spill continuously over the rim of the bowl or backflow from the bowl to the tank.	
45	414.0 Dishwashing Machines.	N/A	
46	415.0 Drinking fountains.	N/A	
47	416.0 Emergency Eyewash and Shower Equipment.	N/A	
48	417.0 Faucets and Fixture Fittings.	N/A	
49	419.0 Food Waste Disposers.	N/A	
50	420.0 Sinks.	N/A	
51	421.0 Floor Sinks.	N/A	
Chapter 5: Water Heaters			

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
52	501.1 Applicability. The regulations of this chapter shall govern the construction, location, and installation of fuel-burning and ether types of water heaters heating portable water, together with chimneys, vents, and their connectors. The minimum capacity for storage water heaters shall be in accordance with the first-hour rating listed in Table 501.1(2). A list of accepted water heater appliance standards is referenced in Table 501.1(1). Listed appliances shall be installed in accordance with the manufacturer's installation instructions. Unlisted water heaters shall be permitted in accordance with Section 504.3.2. Water heaters shall be installed in accordance with the manufacturer's installation instructions. The final installation shall be approved by the Authority Having Jurisdiction	N/A	New term.: first-hour rating
53	504.4 Pressure-Limiting Devices. A water heater installation shall be provided with overpressure protection using an approved, listed device installed in accordance with the terms of its listing and the manufacturer's installation instructions. Pressure relief devices shall have a pressure setting greater than the water service pressure and not exceed 150. pi (1034 kPa) x as required n accordance with the in Section 608.4		
54	505.0 Oil-Burning and Other Water Heaters.	506.0 Oil-Burning and Other Water Heaters	Change the structure of this part. Add more types of water heater.

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
55	506.0 Air for Combustion and Ventilation		Change the structure of the code hereof
Chapter 6: Water Supply and Distribution			
56	601.3 Identification of a Potable and Nonpotable Water System	601.2 Identification of a Potable and Nonpotable Water System.	Add notifications for more type of non-potable water pipes
57	Removed	601.3 Faucets and diverters shall be connected to the water distribution system so that hot water corresponds to the left side of the fittings.	
58	603.3 Backflow Prevention Devices, Assemblies, and Methods	603.2 Backflow Prevention Devices, Assemblies, and Methods	
59	603.3.3 Hose Connection Backflow preventer	N/A	
60	603.3.8 Double Check Detector Fire Protection Backflow Prevention Assembly.	N/A	
61	603.3.9 Reduced Pressure Detector Fire Protection Backflow Prevention Assembly	N/A	
62	603.3.10 Dual Check Backflow Preventer	N/A	
63	603.3.11 Laboratory Faucet Backflow Preventers	N/A	
64	603.3.12 Backflow Preventer with Intermediate Atmospheric Vent	N/A	
65	603.4.1 Backflow Prevention Valve. Where more than one backflow prevention valve is installed on a single premise, and the valves are installed in one location, each separate valve shall be permanently identified by the permittee in a manner satisfactory to the Authority Having Jurisdiction	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
66	603.4.7 Freeze Protection. In cold climate areas, backflow assemblies and devices shall be protected from freezing with an outdoor enclosure that complies with ASSE 1060 or by a method acceptable to the Authority Having Jurisdiction.	603.3.7 In cold climate areas, backflow assemblies and devices shall be protected from freezing by a method acceptable to the Administrative Authority.	
67	603.4.8 Drain Lines. Drain lines serving backflow devices or assemblies shall be sized in accordance with the discharge rates of the manufacturer's flow charts of such devices or assemblies.	N/A	
68	603.4. 4.9 Prohibited d Locations. Backflow prevention devices with atmospheric vents or ports shall not be installed in pits, underground, or submerged locations. Backflow preventers shall not be located in an area containing fumes that are toxic, poisonous, or corrosive	N/A	
69	603.5.6 Protection from Lawn Sprinklers and Irrigation Systems. Potable water supplies to systems having no pumps or connections for pumping equipment, and no chemical injection of provisions for chemical injection, shall be protected from backflow by one of the following devices: (1) Atmospheric vacuum breaker (AVB) (2) Pressure vacuum breaker backflow prevention assembly (PVB) (3) Spill-resistant pressure vacuum breaker (SVB) (4) Reduced pressure principle backflow prevention assembly (RP) (5) A valve complying with IAPMO PS 72	603.4.6 Protection from Lawn Sprinklers and Irrigation Systems 603.4.6.1 Potable water supplies to systems having no pumps or connections for pumping equipment, and no chemical injection or provisions for chemical injection, shall be protected from backflow by one of the following devices: 1. Atmospheric vacuum breaker 2. Pressure vacuum breaker 3. Reduced pressure backflow preventor	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
70	603.5.6.2 Systems with Backflow Devices. Where systems have a backflow device installed. downstream from a potable water supply pump or a potable water supply pump connection, the device shall be one of the following: (1) Atmospheric vacuum breaker (AVB) (2) Pressure vacuum breaker backflow prevention. assembly (PVB) (3) Spill-resistant pressure vacuum breaker (SVB) (4) Reduced-pressure principle backflow prevention assembly (RP)	603.4.6.3 Where systems have a backflow device installed downstream from a potable water supply pump or a potable water supply pump connection, the device shall be one of the following: 1. Atmospheric vacuum breaker 2. Pressure vacuum breaker 3. Reduced pressure backflow preventor	
71	603.5.10 Steam or Hot Water Boilers, Potable water connections to steam or hot water boilers shall be protected from backflow by a double check valve backflow prevention assembly, backflow preventer with intermediate atmospheric vent and pressure reducing valve, or reduced pressure principle backflow prevention assembly in accordance with Table 603.2. Where chemicals are introduced into the system a reduced pressure principle backflow prevention assembly shall pe provided in accordance with table 603.2	603.4.11 Potable Water Make Up Connections to Steam or Hot Water Boilers shall be provided with a listed backflow protection assembly.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
72	603.5.12 Beverage Dispensers. Potable water supply to carbonated beverage dispensers shall be protected by an air gap or a vented backflow preventer that complies with ASSE 1022. For carbonated beverage dispensers, piping material installed downstream of the backflow preventor shall not be affected by carbon dioxide gas. Non-carbonated beverage dispensers, such as ice makers and coffee machines, shall be protected by an air ap or dual check backflow preventer that comply with ASSE 1032 or ASSE 1024	603.4.13 Potable Water Supply to Carbonators shall be protected by a listed reduced pressure principle backflow preventer as approved by the Administrative Authority for the specific use.	
73	Removed	603.4.14 Water Treatment Units. Reverse osmosis drinking water treatment units shall meet the requirements of the appropriate standard(s) referenced in Table 14-1. Waste or discharge from reverse osmosis or other types of water treatment units shall enter the drainage system through an airgap. 603.4.15 Backflow Preventers shall not be located in any area containing fumes that are toxic, poisonous or corrosive.	
74	Removed	603.4.17 Faucets with Hose-Attached Sprays shall vent to atmosphere under back siphonage conditions.	
75	603.5.16 Special Equipment.	N/A	
76	603.5.17 Potable Water Outlets and Valves.	N/A	
77	603.5.18 Pure Water Process Systems.	N/A	
78	603.5.19 Garbage Can Washers.	N/A	
79	603.5.20 Plumbing Fixture Fittings	N/A	
80	603.5.21 Swimming Pools, Spas and Hot Tubs	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
81	603.5.22 Chemical Dispensers	N/A	
82	604.0 Materials. 604.1 Pipe, Tube, and Fittings. Pipe, tube, fittings, solvent cement, thread sealants, solders, and flux used in potable water systems intended to supply drinking water shall comply with NSF/ANSI/CAN 61. Where pipe fittings and valves are made from copper alloys containing more than 15 percent zinc by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in compliance with NSF/ANSI 14. Materials used in the water supply system, except valves and similar devices, shall be of a like material, except where otherwise approved by the AHJ Materials for building water piping and building supply piping shall comply with the applicable standards referenced in Table 604.1.	604.0 Materials 604.1 Water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, or other approved materials. Cast iron fittings used for water need not be galvanized if over two (2) inches (51 mm) in size. Asbestos-cement, CPVC, PE, or PVC water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building. CPVC water pipe and tubing may be used for hot and cold water distribution systems within a building. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where otherwise approved by the Administrative Authority.	Table 604.1: Materials for building supply and water distribution piping and fittings
83	604.2 Lead content	N/A	
84	604,4 Hard-Drawn Copper or Copper Alloy Tubing. Hard-drawn copper or copper alloy tubing for water supply and distribution in addition to the required incised marking shall be marked in accordance with ASTM B88. The colors shall be Type K, green, Type L, blue, and Type M, red.	604.3 In addition to the required incised marking, all hard drawn copper tubing shall be marked by means of a continuous and indelibly colored stripe at least one quarter (1/4) inch (6.4 mm) in width, as follows: Type K, green; Type L, blue; Type M, red; Type DWV, yellow	remove DWV type

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
85	604.5 Flexible Connectors, Flexible water connectors shall be installed in accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/1APMO 2600.	604.4 Listed flexible copper water connectors shall be installed in exposed locations, unless otherwise listed.	
86	604.9 Epoxy Coating. The epoxy coating used on existing, underground steel building supply piping shall comply with NSF/ANSI/CAN 61 and AWWA C210	N/A	for underground steel pipe
87	604.10.1 Tracer Wire. Plastic materials for building supply piping outside underground shall have an electrically continuous corrosion-resistant blue insulated copper tracer wire, or other approved conductor installed adjacent to the piping. Access shall be provided to the tracer wire, or the tracer wire shall terminate above- ground at each end of the nonmetallic piping. The tracer wire size shall be not less than 14 AWG, and the insulation type shall be suitable for direct burial.	N/A	
88	604.12 Flexible Corrugated Connectors. Flexible corrugated connectors of copper, copper alloy, or stainless steel shall be limited to the following connector lengths: (1) Fixture Connectors-30 inches (762 mm) (2) Washing Machine Connectors-72 inches (1829 mm) (3) Dishwasher and Icemaker Connectors 120 inches (3048 mm)	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
89	604.13 Water Heater Connectors. Flexible metallic (copper and stainless steel), reinforced flexible, braided stainless steel, or polymer braided with EPDM core connectors that connect a water heater to the piping system shall comply with ASME A112.18.6/CSA B125.6. Copper, copper alloy, or stainless steel flexible connectors shall not exceed 24 inches (610 mm). PEX, PEX-AL-PEX, PE-AL-PE, or PE-RT tubing shall not be installed within the first 18 inches (457 min) of piping connected to a water heater.	N/A	
90	605.0 Joints and Connections	606.0 Joints and Connections	Add more type of Joints and connections such as: Press-Connect Fittings, Push Fit Fittings…
91	606.0 Valves	605.0 Valves	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
92	606.1 General. Valves up to and including 2 inches (50 mm) in size shall be copper alloy or other approved material. Sizes exceeding 2 inches (50 mm) shall be permitted to have bodies of cast iron, copper alloy, or other approved materials. Each gate or ball valve shall be a fullway or full-port type with working parts of the non-corrosive material. Where valves are made from copper alloys containing more than 15 percent zine by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in compliance with NSF/ANSI 14. Valves carrying water used in potable water systems shall comply with the requirements of ASME A112.4.14/CSA B124.14, ASME B16.34, ASTM F1970, ASTM F2389, AWWA C500, AWWA C504, AWWA C507, IAPMO/ANSI Z1157, MSS SP-67, MSS SP-70, MSS SP-71, MSS SP-72, MSS SP-78, MSS SP-80, MSS SP-110, MSS SP-122, or NSF/ANSI 359. Valves intended to supply drinking water shall also comply with the requirements of NSF/ANSI/CAN 61,	605.1 Valves up to and including two (2) inches (51 mm) in size shall be brass or other approved material. Sizes over two (2) inches (51 mm) may have cast iron or brass bodies. Each gate valve shall be a fullway type with working parts of non-corrosive material	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
93	606.5 Control Valve. A control valve shall be installed. immediately ahead of each water-supplied appliance and immediately ahead of each slip joint or appliance supply. Parallel water distribution systems shall provide a control valve either immediately ahead of each fixture being supplied or installed at the manifold, and shall be identified with the fixture being supplied. Where parallel water distribution system manifolds are located in attics, crawl spaces, or other locations not readily accessible, a separate shutoff valve shall be required immediately ahead of each individual fixture appliance served. 606.5.1 Manifolds. Field installed manifolds for water distribution shall conform with the applicable requirements for valves, pipes, and fittings as referenced in this code. Manufactured water distribution manifolds shall be in accordance with IAPMO IGC 109.	605.5 A control valve shall be installed immediately ahead of each water supplied appliance and immediately ahead of each slip joint or non-metallic fixture supply or appliance supply.	
94	606.8 Check Valve Required. All systems that circulate water by means of a pump or other mechanical device or method shall have a check valve(s) or equal device(s) installed so as to ensure the direction of flow.	N/A	
95	606.9 Leak Detection Devices. Where leak detection devices for water supply and distribution are installed, they shall comply with ANSI/CAN/IAPMO Z1349.	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
96	Removed	607.0 Gravity Supply Tanks Gravity tanks for potable water shall be tightly covered, and have not less than a sixteen (16) square Inch (10,323 mm2) overflow screened with copper screen having not less than fourteen (14) nor more than eighteen (18) openings per linear inch (25.4 mm).	
97	607.0 Potable Water Supply Tanks. 607.1 General. Potable water supply tanks shall be installed in accordance with the manufacturer's installation instructions and supported in accordance with the building code.	N/A	There are new requirements for water tanks in the UPC. These regulations are valuable for many countries where the water pressure in the infrastructure network is insufficient to supply water to the highest plumbing fixtures of buildings.
98	607.2 Private Well Water Tanks. Pressurized potable water tanks for private well water systems shall comply with ASSE 1099/WSC-PST 2000,	N/A	
99	607.3 Potable Water Tanks. Potable water supply tanks, interior tank coatings, or tank liners intended to supply drinking water shall comply with NSF/ANSI/CAN 61	N/A	
100	607.4 Venting. Tanks used for potable water shall be tightly covered and vented in accordance with the manufacturer's installation instructions. Such vent shall be screened with a corrosion-resistant material of not less than number 24 mesh.	N/A	
101	607.5 Overflow. Tanks shall have not less than a 16 square inch (0.01 m^2) overflow that is screened with a corrosion resistant material of not less than number 24 mesh.	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
102	607.6 Valves. Pressurized tanks shall be provided with a listed pressure-relief valve installed in accordance with the manufacturer's installation instructions. The relief valve shall be discharged in accordance with Section 608.5. Where a potable water supply tank is located above the fixtures, appliances, or system components it serves, it shall be equipped with a vacuum relief valve that complies with ANSI Z21.22/CSA 4.4	N/A	
103	608.2 Excessive Water Pressure. Where static water pressure in the water supply piping exceeds 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to 80 psi (552 kPa) or less. Pressure regulators for potable water distribution systems shall comply with ASSE 1003 or AWWA C530. Pressure regulator(s) equal to or exceeding 14 inches (40 mm) shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the AHJ. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. Pipe size determinations shall be based on	608.2 Excessive Water Pressure. Where local static water pressure is in excess of eighty (80) pounds per square inch (552 kPa), an approved type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to eighty (80) pounds per square inch (552 kPa) or less. For potable water services up to and including one and one-half (1-1/2) inch (38 mm) regulators, provision shall be made to prevent pressure on the building side of the regulator from exceeding main supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. All pipe size determinations shall be based on eighty (80) percent of the reduced pressure when using Table 6-5.	Add standards for PRV set

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
	80 percent of the reduced pressure where using Table 610.4.		
104	An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent pressure exceeding 80 psi from developing due to thermal expansion. Expansion tanks used in potable water systems intended to supply only drinking water shall comply with NSF/ANSI/CAN 61. The expansion tank shall be properly sized, securely fastened in the structure, and installed in accordance with the manufacturer's installation instructions and listing. Systems designed by a licensed plumbing contractor or registered design professionals shall be permitted to approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
105	608.3 Expansion Tanks, and Combination Temperature and Pressure-Relief Valves. A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water heater used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Pre-pressurized water expansion tanks shall comply with IAPMO/ANSI Z1088. Such expansion tank or other approved device shall be installed on the building side of the check salve, backflow preventer, or other device and shall be sized, securely fastened to the structure, and installed in accordance with the manufacturer's installation instructions. Exception: An expansion tank shall not be required for an instantaneous non-storage water heater.	608.3 (extract) Any water system provided with a check valve or a pressure regulating device which does not have a bypass feature at its source shall be provided with an approved, listed, adequately sized pressure relief valve.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
106	608.5 Discharge Piping. The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following: (1) Not less than the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down. (2) Materials shall be rated at not less than the operating temperature of the system and approved for such use or shall comply with ASME A112.4.1. 3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet (610 mm) and not less than 6 inches (152 mm) above the ground and pointing downwards. (4)Discharge in such a manner that does not cause personal injury or structural damage (5) No part of such discharge pipe shall be trapped or subject in freezing (6) The terminal and of the pipe shall not be threaded. (7) Discharge from a relief valve into a water heater pan shall be prohibited (8) The discharge termination point shall be readily observable	608.5 Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard drawn copper piping and fittings, CPVC, or listed relief valve drain tube with fittings which will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building with the end of the pipe not more than two (2) feet (610 mm) nor less than six (6) inches (152 mm) above the ground or the flood level of the area receiving the discharge and pointing downward. Such drains may terminate at other approved locations. No part of such drain pipe shall be trapped and the terminal end of the drain pipe shall not be threaded	
107	608.7 Vacuum Relief Valves. Where a hot-water storage tank or an indirect water heater is located at an elevation above the	608.7 Vacuum Relief Valves. Where a hot water storage tank or an indirect water heater is located at an elevation above the	Add standard for relief valve

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
	fixture outlets in the hot-water system, a vacuum relief valve that complies with ANSI Z21 22/CSA 4.4 shall be installed on the storage tank or heater.	fixture outlets in the hot water system, a vacuum relief valve shall be installed on the storage tank or heater.	
108	609.8 Pumps. Pumps shall be installed in accordance with the manufacturer's installation instructions. 609.8.1 Access. Pumps shall be accessible for repair. 609.8.2 Potable Water Pumps. Pumps intended to supply drinking water shall be in accordance with NSF/ANSI CAN 61. 609.8.3 Hot-Water Recirculating Pumps. For health care facilities, long term care facilities, hotels, or motels, devices that automatically turn off the recirculation pump(s) shall not be required.	N/A	
109	609.11 Water Hammer. Building water supply systems where quick-acting valves are installed shall be provided with water hammer arrester(s) to absorb high pressures resulting from the quick closing of these valves. Water hammer arresters shall be approved mechanical devices that comply with ASSE 1010 or PDI WH 201 and shall be installed as close as possible to quick-acting valves.	609.10 Water Hammer. All building water supply systems in which quick-acting valves are installed shall be provided with devices to absorb high pressures resulting from the quick closing of these valves. These pressure-absorbing devices shall be either air chambers or approved mechanical devices. Water pressure shock arrestors shall be installed as close as possible to quick-acting valves at the end of long pipe or near batteries of fixtures or both.	Add standard for Water hammer
110	Removed	609.10.1 Air Chambers. Where air chambers are installed, they shall be in an accessible place, and each air chamber shall be provided with an accessible means for restoring the air in the event that the chamber becomes waterlogged.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
111	609.12 Pipe Insulation. Insulation of domestic hot water piping shall be in accordance with Section 609.12.1 and Section 609.12.2. 609.12.1 Insulation Requirements. Domestic hot water piping shall be insulated. 609.12.2 Pipe Insulation Wall Thickness. Hot water pipe insulation shall have a minimum wall thickness of not less than the diameter of the pipe for a pipe up to 2 inches (50 mm) in diameter. Insulation wall thickness shall be not less than 2 inches (51 mm) for a pipe of 2 inches (50 mm) or more in diameter. Exceptions: (1) Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. (2) Hot water piping between the fixture control valve or supply stop and the fixture or appliance shall not be required to be insulated.	N/A	New quick rule for Pipe insulation!!! But for hot water pipe only

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
112	Removed	610.12 Sizing Systems with Hot Water Piping. In sizing a water piping system, the greatest developed length of the cold water supply may be used (from Table 6-5) and the length of the hot water piping ignored when the hot water piping friction loss is compensated for by the following method: (1) Compute the total hot water fixture unit demand, using those values given in Table 6-4 for the combined hot and cold water use. (2) Assign the total demand computed as required in (1) above, as the fixture unit demand at the hot water heater inlet. (3) Starting at the most remote outlet on the cold water piping and working back toward the water meter, compute the pipe sizing for the system from the column originally selected in Table 6-5, using the fixture unit values given in Table 6-4, and adding in the fixture unit demand of the hot water heater supply inlet as computed in (1) above, at the point where it occurs. The final size of the cold water branch or main need not exceed the originally established size of the building supply.	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
113	Removed	610.13 Except as provided in Section 610.12, water piping systems may be designed by taking the total length of the supply piping from the source of cold water supply through the water heater, to the most remote hot water outlet and assessing flow values of seventy-five (75) percent of the combined hot and cold water demand as given in Table 6-4, to the piping supplying either hot or cold water to those fixtures served by both. Piping serving water heaters shall be sized to deliver the above required hot water demand, plus all required cold water demands, but in no case need the piping be larger in size than that required by Table 6-5 for the total building supply.	
114	610.0 Size of Potable Water Piping		Generally, most projects in Vietnam use the sizing method described in TCVN 4513:1987, which employs numerical formulas. In TCVN 4513, the WSFU (Water Supply Fixture Unit) is utilized, resulting in flow rates. These flow rates are then used to determine pipe diameter and unit friction loss based on velocity requirements, which vary depending on the function of the pipes.
115	610.12 Sizing for Velocity	N/A	Different from the Russian approach
116	611.0 Drinking Water Treatment Units	N/A	Provide Standards for types of treatment and sizing method for residential water softeners.

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
117	612.0 Residential Fire Sprinkler system		Apply NFPA 13D for one- and two-family dwellings or townhouses.
Chapter 7: Sanitary Drainage			
118	Removed	701.1	Remove old requirements regarding the materials of drainage pipes.
119	701.2 Drainage piping	N/A	Add new requirements and table 701.2: Materials for drain, waste, vent pipe and fittings
120	701.4 Continuous Wastes. Continuous wastes and fixture tailpieces shall be constructed from the materials specified in Section 701.2 for drainage piping, provided, however, that such connections where exposed or accessible shall be permitted to be of seamless drawn brass not less than No. 20 B & S Gauge (0.032 inches) (0.8 mm).	N/A	
121	703.0 Size of Drainage Piping		Generally, projects in Vietnam apply the sizing method directly from the UPC because it is easy to follow. However, for some resort projects located near the beach, the client is concerned about sand entering the floor drain. The question arises: What drainage pipe design in this case could ensure that the flow rate in the pipe is equal to the self-cleansing velocity?
122	704.0 Fixture Connection (Drainage)		Delete clause 704.4 Closet Rings (Closet Flanges)

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
123	705.0 Joints and Connections		Change the structure of this part. Add more types of joints and connections
124	707.2 Approved. Each cleanout fitting and each cleanout plug or cap shall be of an approved type. A list of approved standards for cleanouts are referenced in Table 707.2	N/A	Add standards for CO
125	707.4 Location. Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping, that is more than 100 feet (30 480 mm) in total developed length, shall be provided with a cleanout for each 100 feet (30 480 mm), or fraction thereof, in length of such piping. An additional cleanout shall be provided in a drainage line for each aggregate horizontal change in direction exceeding 135 degrees (2.36 rad). A cleanout shall be installed above the fixture connection fitting, serving each urinal, regardless of the location of the urinal in the building.	707.4 Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal and each run of piping, which is more than one hundred (100) feet (30480 mm) in total developed length, shall be provided with a cleanout for each one hundred (100) feet (30480 mm), or fraction thereof, in length of such piping.	
126	707.4.1 Load Rated Cover. Cleanout floor covers and top rims meant to take loads shall be rated for the loading in accordance with ASME A112.36.2M	N/A	
127	707.14 Trap Arms. Cleanouts for trap arms shall be installed in accordance with Section 1002.3.	N/A	
128	708.0 Grade of Horizontal Drainage Piping		Vietnam has adopted an alternative approach. In cases where it is difficult to meet the 2% slope requirement, the minimum slope of drainage

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
			pipes (1/D) will be utilized. This slope is designed to create self-cleansing velocity in pipes, following the principles of Russian theory.
129	710.6 Backwater Valves. Backwater valves, gate valves, fullway ball valves, unions, motors, compressors, air tanks, and other mechanical devices required by this section shall be located where they will be accessible for inspection and repair and, unless continuously exposed, shall be enclosed in a masonry pit fitted with an adequately sized removable cover. Backwater valves shall comply with ASME A112.14.1 or IAPMO IGC 305, and have bodies of cast-iron, plastic, copper alloy, or other approved materials, shall have noncorrosive bearings, seats, and self-aligning discs, and shall be constructed to ensure a positive mechanical seal. such backwater valves shall remain open during periods of low flows to avoid screening of solids and shall not restrict capacities or cause excessive turbulence during peak loads. Unless otherwise listed, valve access covers shall be bolted type with gasket, and each valve shall bear the manufacturer's name cast into the body and the cover.		Add standards for Backwater valve

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
130	710.9 Alarm. Such sumps and receiving tanks shall be automatically discharged and, wherein a "public use" occupancy, shall be provided with dual pumps or ejectors arranged to function alternately in normal use and independently. Such pumps shall be capable of running continuously in case of overload or mechanical failure of one of the pumps or ejectors. The pumps shall have an audio and visual alarm, readily accessible, that signals pump failure or an overload condition. The lowest inlet shall have a clearance of not less than 2 inches (51 mm) from the high-water or "starting" level of the sump.	710.9 All such sumps and receiving tanks shall be automatically discharged and, when in any "public use" occupancy, shall be provided with dual pumps or ejectors arranged to function independently in case of overload or mechanical failure. The lowest inlet shall have a minimum clearance of two (2) inches (51 mm) from the high water or "starting" level of the sump.	
131	710.11 Air Tanks		
132	7.10.12 Grinder Pump Ejector		Sewage pump: High flowrate, low head Grinder pump: Low flowrate, High head
133	710.13 Macerating Toilet Systems and Pumped Waste Systems. Fixtures shall be permitted to discharge to a macerating toilet system, or pumped waste system shall be permitted as an alternate to a sewage pump system where approved by the AHJ. Such systems shall comply with ASME A112.3.4/CSA 845.9 and shall be installed in accordance with the manufacturer's installation instructions.	N/A	
134	710.13.1 Sumps. The sump shall be watertight and gastight	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
135	710.13.2 Discharge Piping. The discharge piping shall be sized in accordance with manufacturer's instructions and shall be not less than 3% of an inch (20 mm) in diameter. The developed length of the discharge piping shall not exceed the manufacturer's instructions. A check valve and full way-type shutoff valve shall be located within the discharge line or internally within the device	N/A	
136	710.13.3 Venting. The plumbing fixtures that discharge into the macerating device shall he vented in accordance with this code. The sump shall be vented in accordance with the manufacturer's instructions, and such vent shall be permitted to connect to the fixture venting	N/A	
137	711.10 Suds Relief		In Vietnam, Bathtub hasn't been considered as suds-producing fixtures yet. Therefore, it is drained into grey drainage pipes, which include floor drains and lavatories.
138	Part 2 - Building sewers		Many engineers in Vietnam, both junior and experienced, misunderstand that building sewers refer to external drainage pipes (public sewers). Consequently, they apply TCVN 7957:2008 (now TCVN 7957:2023) or QCVN 07-2:2016 (now QCVN 07-2:2023) in their designs, which are actually meant for public sewers.

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
139	713.2 Private Sewage Disposal System. Where no public sewer intended to serve a lot or premises is available in a thoroughfare or right of way abutting such lot or premises, drainage piping from a building or works shall be connected to a private sewage disposal system as approved by the Authority Having Jurisdiction. See appendix H		Septic tanks and sewage treatment plants (STPs) for individual buildings are common practices in Vietnam, even in areas with public sewers. However, septic tanks in Vietnam typically consist of three chambers, unlike the two-chamber type described in the UPC.
140	717.10 Size of Building Sewers.		In Vietnam, building sewers are sized following N.N. Pavlovski's method, derived from Russian study. Generally, for a specific pipe and the same slope, the flow rate yielded by the N.N. Pavlovski's formula will be slightly smaller than the flow rate following the Manning formula.
141	715.3 Existing Sewers. Where permitted by the Authority Having Jurisdiction, trenchless methods of rehabilitation of existing building sewer and building storm sewers shall be installed in accordance with Section 715.3.1 or Section 715.3.2. 715.3.1 Sewer Pipe Lining. For trenchless installation of resin-impregnated flexible tubing to line existing building sewers and building storm sewers installation shall be in accordance with ASTM F1216, ASTM F2561, ASTM F2599, or ASTM F3240. 715.3.2 Sewer Pipe Replacement. For trenchless installation of polyethylene (PE) pipe using the pipe bursting method to replace existing building sewers and		

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
	building storm sewers materials shall be in accordance with ASTM F714		
142	718.0 Grade, Support, and Protection of Building Sewers. 718.1 Slope. Building sewers shall be run is practical alignment and at a uniform slope of not less than 1/4 inch per foot (20.8 mm/m) toward the point of disposal. Exception: Where approved by the AHJ and where it is impractical, due to the depth of the street sewer, the structural features of the arrangement of a building or structure, to obtain a slope of 1/4 inch per foot (20.8 mm/m), piping 4 inches (100 mm) through 6 inches (150 mm) shall be permitted to have a slope of not less than 1/8 inch per foot (10.4 mm/m) and piping 8 inches (200 mm) and larger shall be permitted to have a slope of not less than 1/16 inch per foot (5.2 mm/m). The maximum and minimum fixture unit loading shall be in accordance with Table 717.1		The minimum slope value of 1/D is a common practice in sewer and street sewer design in Vietnam.
Chapter 8: Indirect Wastes			

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
143	811.2 Waste and Vent Pipes. Each waste pipe receiving or intended to receive the discharge of a fixture into which acid or corrosive chemical is placed, and each vent pipe connected thereto, shall be constructed of chlorinated polyvinyl chloride (CPVC), polypropylene (PP), polyvinylidene fluoride (PVDF), chemical-resistant glass, high-silicon iron pipe, or lead pipe with a wall thickness of not less than 1/8 of an inch (3.2 am); an approved type of ceramic glazed or unglazed vitrified clay, or other approved corrosion-resistant materials. CPVC pipe and fittings shall comply with ASTM F2618. PP pipe and fittings shall comply with ASTM F1412 or CSA B181.3. PVDF pipe and fittings shall comply with ASTM F1673 or CSA B181.3. Chemical resistant glass pipe and fittings shall comply with ASTM C1053. High-silicon iron pipe and fittings shall comply with ASTM A861.	811.2 Each waste pipe receiving or intended to receive the discharge of any fixture into which acid or corrosive chemical is placed and each vent pipe connected thereto, shall be constructed of chemical resistant glass, high silicon iron pipe, or lead pipe not less than one-eighth (1/8) inch (3.2 mm) wall thickness, an approved type of ceramic glazed or unglazed vitrified clay, or other approved corrosion resistant materials.	Add standards for pipes
144	Removed	814.0 Refrigeration Wastes	
145	Removed	815.0 Air-Conditioning Equipment.	
146	814.0 Condensate Waste and Control.	N/A	
Chapter 9: Vents			

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
147			In my experience, venting is the system that has the most problems in designing and installation, compared to other systems. These problems exist even in the course books in Vietnam. Many engineers I have discussed with and interviewed misunderstand the function of the vent system as merely directing gas flow. Another common mistake is making connections below the overflow level of the fixture.
148	903.0 Materials. 903.1 Applicable Standards, Vent pipe and fittings shall comply with the applicable standards referenced in Table 701.2, except that: (1) No galvanized steel or 304 stainless steel pipe installed underground and shall be not less than 6 inches (152 mm) aboveground. (2) ABS and PVC DWV piping installations shall be in accordance with Chapter 14 Firestop Protection." Except for individual single-family dwelling units, materials exposed within ducts or plenums shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 where tested in accordance with ASTM E84 or UL 723. Plastic piping installed in plenums shall be tested in accordance with all requirements of ASTM E84 or UL 723. Mounting	903.0 Materials 903.1 Vent pipe shall be cast iron, galvanized steel, galvanized wrought iron, lead, copper, brass, Schedule 40 ABS DWV, Schedule 40 PVC DWV or other approved materials having a smooth and uniform bore except that: 903.1.1 No galvanized wrought iron or galvanized steel pipe shall be used underground and shall be kept at least six (6) inches (152 mm) above ground. 903.1.2 ABS and PVC DWV piping installations shall be limited to structures not exceeding three floors above grade. For the purpose of this subsection, the first floor of a building shall be that floor that has fifty (50) percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
	methods, supports and sample sizes of materials for testing that are not specified in ASTM E84 or UL 723 shall be prohibited.	only for vehicle parking, storage, or similar use shall be permitted	
149	Removed	903.3 Vent fittings shall be cast iron, galvanized malleable iron or galvanized steel, lead, copper, brass, ABS, PVC, or other approved materials, except that no galvanized malleable iron or galvanized steel fittings shall be used underground and shall be kept at least six (6) inches (152 mm) above ground	
150	908.2 Horizontal Wet Venting for a Bathroom Group. A bathroom group located on the same floor level shall be permitted to be vented by a horizontal wet vent where all of the conditions of Section 908.2.1 through Section 908.2.5 are met	N/A	
151	908.2.1 Vent Connection. The dry vent connection to the wet vent shall be an individual vent for the bidet, shower, or bathtub. One or two vented lavatory(s) shall be permitted to serve as a wet vent for a bathroom group. Only one wet vented fixture drain or trap arm shall discharge upstream of the dry-vented fixture drain connection. Dry vent connections to the horizontal wet vent shall be in accordance with Section 905.2 and Section 905.3.	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
152	908.2.2 Size. The wet vent shall be sized based on the fixture unit discharge into the wet vent. The wet vent shall be not less than 2 inches (50 mm) in diameter for 4 drainage fixture units (dfu) or less, and not less than 3 inches (40 mm) in diameter for 5 dfu or more. The dry vent shall be sized in accordance with Table 702.1 and Table 703.2 based on the total fixture units discharging into the wet vent.	N/A	
153	908.2.3 Trap Arm. The length of the trap arm shall not exceed the limits in Table 1002.2. The trap size shall be in accordance with Section 1003.3. The vent pipe opening from the horizontal wet vent, except for water closets and similar fixtures, shall not be below the weir of the trap	N/A	
154	908.2.4 Water Closet. The water closet fixture drain or trap arm connection to the wet vent shall be downstream of fixture drain or trap arm connections to the horizontal wet vent	N/A	
155	908.2.5 Additional Fixtures. Additional fixtures shall discharge downstream of the wet vent system and be conventionally vented. Only the fixtures within the bath room group shall connect to the wet-vented horizontal branch	N/A	

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
156	910.4 Connections and Size. Branches serving traps shall connect to the main line at an angle not exceeding 2 percent. Each waste pipe and each trap in such a system shall be not less than two pipe sizes exceeding the sizes required by Chapter 7 of this code, and not less than two pipe sizes exceeding a fixture tailpiece or connection.	910.4 Each waste pipe and each trap in any such system shall be at least two (2) pipe sizes larger than the sizes required by Chapter 7 of this Code, and at least two (2) pipe sizes larger than any fixture tailpiece or connection	
157	911.0 Circuit Venting	N/A	New requirement for new venting system
158	912.0 Engineered Vent system	N/A	
Chapter 10: Traps and Interceptors			
159	1002.2 Fixture Traps. Each fixture trap shall have a protecting vent so located that the developed length of the trap arm from the trap weir to the inner edge of the vent shall be within the distance given in Table 1002.2 but in no case less than two times the diameter of the trap arm	1002.2 Each fixture trap shall have a protecting vent so located that the developed length of the trap arm from the trap weir to the inner edge of the vent shall be within the distance given in Table 10-1, but in no case less than two (2) times the diameter of the trap arm.	update values in the table
160	1004.2 Movable Parts. Bladders, check valves or another type of devices with moveable parts shall be prohibited to serve as a trap.	N/A	
161	1007.2 Trap Seal Primers. Potable water supply trap seal primer valves shall comply with ASSE 1018. Drainage or electronic design type trap seal primer devices shall comply with ASSE 1044 or IAPMO PS 76.	N/A	New system

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
162	1009.0 Interceptors (Clarifiers) and Separators. 1009.1 Where required. Interceptors (clarifiers) (including grease, oil, sand, solid interceptors, etc) shall be required by the AHJ where they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to the building drainage system, the public or private sewer, or to public or private sewage disposal. A list of acceptable interceptor standards is referenced in Table 1009.1.	1009.0 Industrial Interceptors (Clarifiers) and Separators 1009.1 When required. Interceptors (clarifiers) (including grease, oil, and sand interceptors (clarifiers), etc) shall be provided when, in the judgment of the Administrative Authority, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to the building drainage system, the public or private sewer or to public or private sewage disposal.	Add standards table
163	1014.0 Grease Interceptors		change the structure of this section. Separate it to two different parts: Hydromechanical Grease interceptor (1014.2) and Gravity Grease Interceptor (1014.3)
164	1015.0 FOG (Fats, Oils, and Greases) Disposal System	N/A	
165	Removed	1016.4 Alternate Design. Alternate designs for construction or baffling of sand interceptors complying with the intent of this Code may be submitted to the Administrative Authority for approval	
166	1017.2 Interceptor Design Alternatives. Oil interceptors shall comply with IAPMO IGC 183 or be in accordance with Section 1017.3 through Section 1017.4		Add standard for the alternative design of Oil interceptors
Chapter 11: Storm Drainage			

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
167	1101.4 Material Uses. Pipe, tube, and fittings conveying rainwater shall be of such materials and design as to perform their intended function to the satisfaction of the AHJ. Conductors within a a vent or shaft shall be of cast-iron, galvanized steel, wrought iron, copper, copper alloy, lead, Schedule 40 ABS DWV, Schedule 40 PVC DWV, stainless steel 304 or 316L. (stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) aboveground), or other approved materials, and changes in direction shall be in accordance with the requirements of Section 706.0, ABS and PVC DWV piping installations shall be installed in accordance with applicable standards referenced in Chapter 17 and Chapter 14 "Firestop Protection." Except for individual single-family dwelling units, materials exposed within ducts or plenums shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723. Plastic piping installed in plenums shall be tested in accordance with all requirements of ASTM E84 or UL 723. Mounting methods, supports and sample sizes of of materials for testing that are not specified in ASTM E84 or UL 723 shall be prohibited.	1101.3 Material Uses. Rainwater piping placed within the interior of a building or run within a vent or shaft shall be of cast iron, galvanized steel, wrought iron, brass, copper, lead, Schedule 40 ABS DWV, Schedule 40 PVC DWV, or other approved materials, and changes in direction shall conform to the requirements of Section 706.0. ABS and PVC DWV piping installations shall be limited to structures not exceeding three floors above grade. For the purpose of this subsection, the first floor of a building shall be that floor that has fifty (50) percent or more of the exterior wall surface area level with or above finished grade. One (1) additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted.	Add standards for pipe materials
168	1101.12 Roof Drainage		change the structure of the section

No.	2024 UPC	VN Plumbing Code (based on 1997 UPC)	NOTE
169	1102.0 Roof Drains		Following TCVN 4474:1987 is common practice in Vietnam.
Chapter 12-Chapter 16 (New chapters)			

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