

September 5, 2025

# Data Centers, Part One: General Overview and Modular Design

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## General Overview

The data center construction market is set to more than double over the next 10 years, to just under \$500 billion. Much of this push for data centers focuses on artificial intelligence (AI), cryptocurrency, data mining, and increased global digitization.

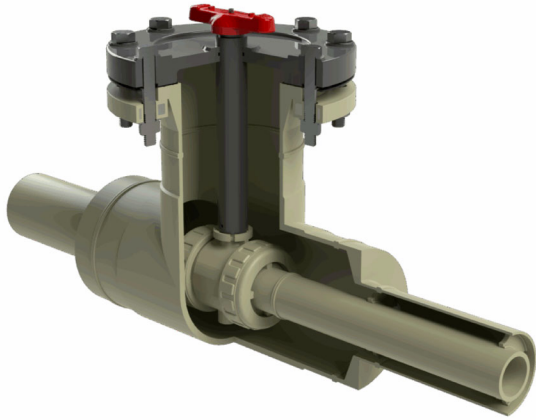
As of this writing, there are 5,426 data centers just in the United States. States like California kicked off the data center boom, constructing a large number of them in the Silicon Valley area. Since then, states like Virginia, Texas, and Georgia have been increasingly hosting the largest number of emerging projects. According to [Industrial Info Resources \(IIR\)](#), the state of Virginia, and particularly the DC area, is expected to construct around 700 projects over the next 10 years.

With the increase in data center construction, cooling demands can put a significant strain on the power and water used for local infrastructure. To minimize disruption to local utilities, many data center designs now focus on reusing and recycling as much water as possible, as well as incorporating some sort of localized power source.

Before getting into the details of the plumbing in a data center, it's important to examine the general layout of a data campus and the data center buildings that occupy it. Additionally, seeing as most of these data centers are being assembled in a "modular" fashion, we'll look at what that means for suppliers and distributors.

## Data Center Campus and Buildings: A Modular Way of Thinking

A data center campus can have dozens of buildings, depending on the data needs of the users it serves. The campus is typically constructed in phases over several years, sometimes spanning a decade or more. The strategy behind this method is that it allows the data center increased flexibility, as it can put future projects on hold if the demand for the data center is low. If demand picks up, the next phase of building can resume.



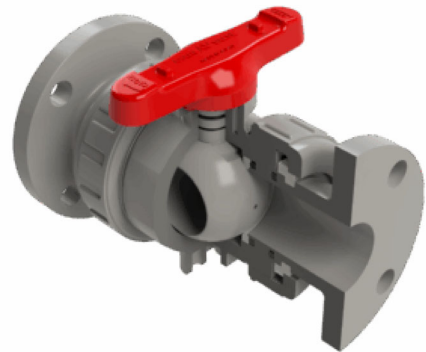
*An example of a pre-fabricated double contained valve tee assembly from Asahi/America*

Each phase typically takes one to two years to execute due to the modular design of the data center buildings. Modular design is a fancy way of saying that most of the parts of the data center are pre-assembled off-site. For instance, parts of the cooling system, power sources, and IT modules are put together elsewhere by suppliers and then integrated into the building. Pre-fabrication is relied upon for the modular construction of a data center, and is among the many services that Asahi/America offers. We have a team of engineers who

have extensively worked with customers to help design and render everything from full-building plumbing designs to high purity water skids for semiconductor manufacturers. Additionally, Asahi/America has a sizeable [BIM and CAD library](#) that its experienced team can utilize for design recommendations before any assembly takes place.

In the case of the data center's cooling system, the chiller, cooling towers, and air handling units would all be pre-assembled off-site. The pre-assembled cooling system also means that the chemical dosing units that keep the facility's water clean are pre-assembled off-site as well. Here is the good news: these are the same chemical dosing units that are used to treat drinking, industrial, and wastewater. Why is that good news? The same types of chemicals used in water treatment plants are also employed in data centers, and they are manufactured

by the same companies, making them widely available. Chemicals such as sulfuric acid, peroxides, bleach, corrosion inhibitors, biocides, and anti-scaling agents are all used to treat and recycle the water throughout the building. A data center campus may also have a final water treatment facility for any water that is discharged from the campus. However,



*Asahi/America's Type-21a Vented Ball Valve*

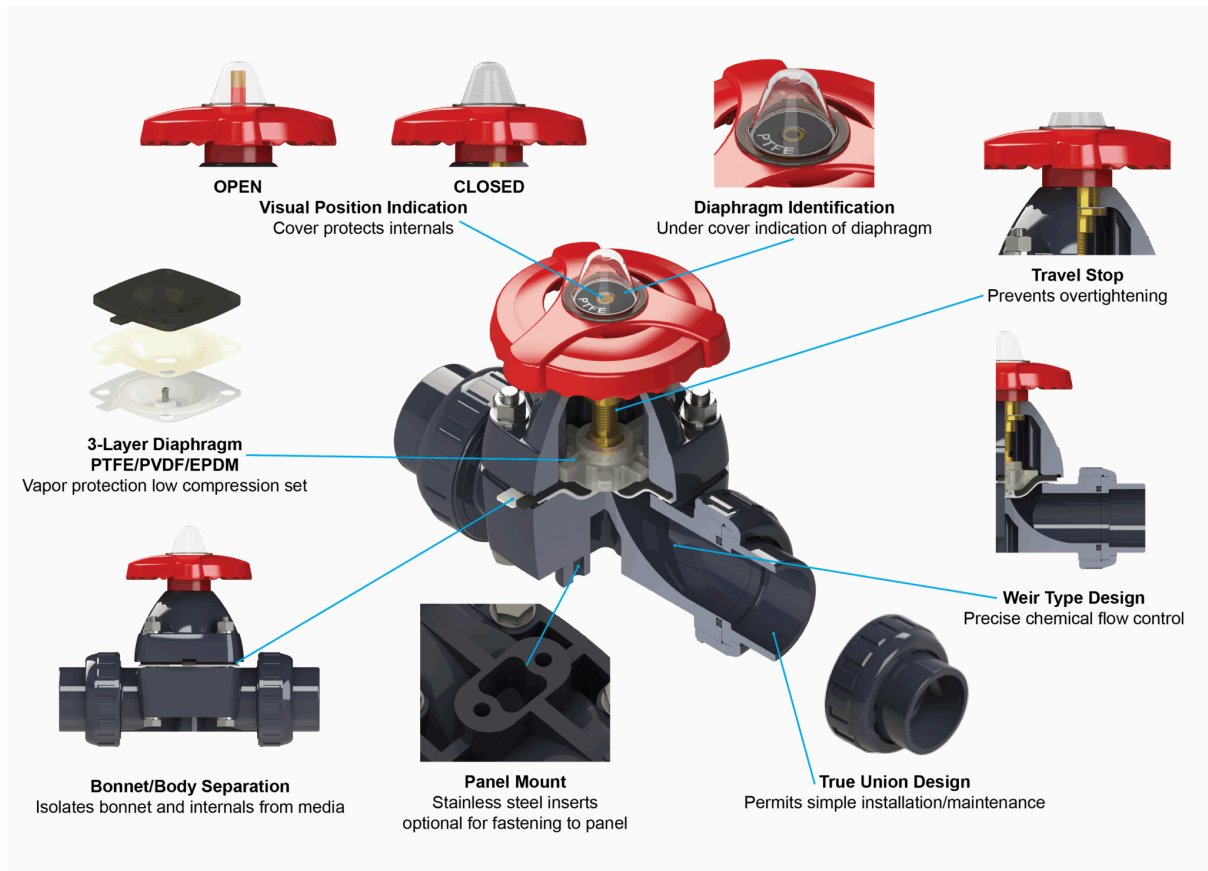
most current data center designs require recycling the facility's water as much as possible to minimize the strain on local utilities.

### **Asahi/America Product Spotlight**

Data centers, especially those utilizing liquid cooling, will have a facilities water system (FWS) where the water must meet drinking water quality standards. This requirement means that the water treatment methods and chemicals used in those data centers must be the same as those used in municipal drinking water. Typically, in an FWS, you will see chemical dosing skids for substances such as bleach, sulfuric acid, and caustic.

Asahi/America's engineering and fabrication groups have successfully designed and built a diverse portfolio of ready-to-drop-in parts for chemical dosing skid assemblies, as well as connections and plumbing for water treatment facilities around the country. With Asahi/America, you not only get high-quality pipes, valves, and actuation, but you also get a team of engineering and fabrication experts to help with the design of your data center plumbing needs

Most FWS loops will include some sort of bleach treatment, combined with sulfuric acid and caustic to maintain pH balance. You can also expect to see ozone treatments, as well as corrosion and scaling inhibitors. For applications where there is a potential for gas buildup (i.e., processes using bleach, ozone, etc.), Asahi/America offers the Type-21a Vented Ball Valve, which includes a 1/8" vent hole positioned to the upstream side of the valve, preventing pressure buildup due to off-gassing. We also offer the Type-14 Diaphragm Valve for these applications, featuring a specially designed three-layer, non-laminated diaphragm that provides both a gas and chemical barrier, capable of making a bubble-tight seal.



*A breakdown of the components of the Type-14 Diaphragm Valve*

For general building plumbing with a broad spectrum of chemical resistance, Asahi/America offers one of the highest-quality polyethylene pipes on the market today in its Chem Proline® PE100-RC (or Advanced PE) piping system. The PE100RC resin exhibits slow crack growth resistance 30 times higher than standard domestic PE 4710. Generally speaking, the higher the slow-crack growth resistance, the longer the working life of the HDPE pipe. Butt or socket fusion welded for joint durability, coupled with good broad chemical resistance and an additive that allows it to be used for both indoor and outdoor applications, Chem Proline® is a versatile, general-use pipe for a large part of a data center's plumbing, cooling systems, and chemical dosing requirements.

Asahi/America's Proline® PP-R piping system is an excellent choice for indoor use, such as in a data center's plumbing systems. Proline® PP-R is a random co-polymer that exhibits improved durability, stress-crack resistance, and low-temperature toughness when compared to PP-H pipes. Additionally, Proline® PP exhibits a broad range of chemical resistance similar to PE100-RC, and has a higher operating temperature range compared to PE100-RC. Butt or socket fusion welded for joint durability; Proline® PP is another great general-use pipe that can be used in a large part of a data center's plumbing.



*The Chem Proline® PE100-RC (Advanced PE) piping system*

Stay tuned in the coming weeks for the second installment in our Data Centers series, where we'll talk about air cooling versus liquid cooling within data centers. In the meantime, we encourage you to browse our relevant resources, including [this quick-reference data center](#)

[solutions flyer](#) !



*The Proline® PP-R piping system*

**EDITOR'S NOTICE: Please note, the information in this article is for educational purposes only and does not supersede any Asahi/America technical information or product specifications. Please consult Asahi/America's technical department at 1-800-343-3618 or [pipe@asahi-america.com](mailto:pipe@asahi-america.com) on all product applications in regards to material selection based on the pressure, temperature, environmental factors, chemical, media, application, and more.**

## Ask a Question!

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