Water Service Size Calculation Worksheet

City of Evanston

Water Service Size Calculation Worksheet

Property Address: _____

Property Owner Name: _____

Permit Application No: _____

Permit Application No: _____

Type of Occupancy: Single Family ☐ Multifamily ☐ Commercial ☐

Applicant Name: _____

Applicant Address: _____

Applicant Phone: _____ Fax: _____

Please complete the table below, and return the completed form to the Building and Inspection Services Division as a part of your permit submittal.

Fixture Type	Total Number of Fixtures (New + Existing)	x	Unit Load Value	=	Water Supply Fixture Units (W.S.F.U.)
Water Closets			3.0		
Lavatories			1.0		
Bathtubs/Showers			2.0		
Kitchen Sink			2.0		
Dishwasher			1.0		
Laundry Sink			3.0		
Laundry Machine			2.0		
TOTAL					

Existing Water Service Pipe Size*: _____inches

Required Water Service Pipe Size (see reverse side): _____inches

If your existing water service size is less than the required size, your water service will need to be upgraded as a part of your proposed project scope.

*If unsure about the size of an existing water service, please contact the Water and Sewer Division of Public Works at 847-448-4311

Property Owner's Signature: _____ Date: _____

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Water service size calculation worksheet is a critical tool used by engineers, architects, and plumbing professionals to determine the appropriate water service line size for residential, commercial, or industrial buildings. The water service line is essential for delivering potable water from the municipal supply or a private well to a property. An accurately calculated service size ensures optimal water pressure, flow rate, and overall system performance, while also adhering to local plumbing codes and regulations. This article aims to provide a comprehensive understanding of the water service size calculation worksheet, its importance, methodology, and applications.

Importance of Water Service Size Calculation

Determining the correct size of the water service line is vital for several reasons:

1. Adequate Water Supply: A properly sized water service line ensures that sufficient water is available for all fixtures and appliances, preventing issues such as low pressure or interruptions in service.

2. Efficiency: Oversized pipes can lead to increased costs due to higher material requirements, while undersized pipes can cause pressure drops and inefficiency, making accurate calculations essential.

3. Compliance: Many regions have plumbing codes that stipulate minimum requirements for water service sizes. Adhering to these codes prevents potential legal issues and ensures

safety.

4. Longevity: Correct sizing can prevent premature wear and tear on plumbing systems, reducing maintenance costs and prolonging the lifespan of pipes and fixtures.

Factors Influencing Water Service Size

When calculating water service size, several factors must be considered:

1. Fixture Units

Fixture units represent the demand for water from various fixtures and appliances. Different fixtures have assigned values based on their flow rates and usage frequency. Common fixture units include:

- Toilet: 2-3 fixture units
- Shower: 2 fixture units
- Lavatory Sink: 1 fixture unit
- Washing Machine: 2 fixture units
- Dishwasher: 1-2 fixture units

The total fixture units in a building can be calculated by adding the units from all fixtures.

2. Flow Rate and Pressure

Flow rate, measured in gallons per minute (GPM), is the volume of water delivered by the service line. It is influenced by:

- Number of Fixtures: More fixtures typically require a higher flow rate.
- Peak Demand Periods: Identifying peak usage times helps ensure that the service line can handle maximum demand.

Water pressure, measured in pounds per square inch (PSI), is also crucial. Adequate pressure is necessary to ensure that water reaches all points in the building without significant drops.

3. Distance from Supply Source

The distance from the municipal water supply or well to the building affects the pressure and flow rate. Longer distances can result in pressure losses due to friction within the pipe.

4. Pipe Material

Different materials have varying friction coefficients, influencing flow rates. Common pipe materials include:

- Copper: Durable and efficient but can be more expensive.
- PVC: Cost-effective and lightweight, suitable for various applications.
- PEX: Flexible and easy to install, becoming increasingly popular in residential settings.

5. Elevation Changes

If the building is located on a slope or has multiple levels, elevation changes can significantly affect water pressure. Calculating these changes is crucial for accurate sizing.

Water Service Size Calculation Methodology

The process for calculating the appropriate water service size involves several steps, which can be outlined as follows:

Step 1: Determine Fixture Units

Compile a list of all fixtures and their corresponding fixture unit values. Add these to find the total fixture units for the building.

Step 2: Calculate the Required Flow Rate

Using the total fixture units, convert the number of fixture units into the required flow rate (GPM). This can typically be done using tables or formulas provided by plumbing codes.

Step 3: Adjust for Demand Factors

Consider peak demand factors based on the building type (residential, commercial, or industrial) and adjust the flow rate accordingly. This ensures that the calculated flow rate meets the highest expected demand.

Step 4: Assess Pressure Losses

Calculate potential pressure losses due to friction, elevation changes, and fittings. This can be done using the Darcy-Weisbach equation or the Hazen-Williams formula, depending on

the complexity of the system.

Step 5: Determine Pipe Diameter

Based on the required flow rate and pressure losses, consult standard pipe sizing charts to determine the appropriate diameter of the water service line. Make sure to consider the pipe material and local code requirements.

Step 6: Verify Compliance with Local Codes

Ensure that the selected pipe size meets local plumbing codes. Different jurisdictions may have varying requirements, so it is essential to consult local regulations.

Tools and Resources for Calculation

To facilitate the water service size calculation process, several tools and resources are available:

1. Water Service Size Calculation Worksheets: These worksheets provide a structured format for inputting data and performing calculations.

2. Plumbing Code Handbooks: Most regions have plumbing codes that offer guidelines and tables for fixture units, flow rates, and pipe sizing.

3. Online Calculators: Various online tools can help automate the calculation process, providing quick results based on entered parameters.

4. Software Programs: Advanced software designed for plumbing system design can provide detailed analyses of water service sizing, including simulations and compliance checks.

Common Mistakes to Avoid

When utilizing a water service size calculation worksheet, it is crucial to be aware of common pitfalls:

1. Underestimating Fixture Units: Failing to account for all fixtures can lead to undersized service lines.

2. Ignoring Peak Demand: Not adjusting for peak demand can result in insufficient flow during high usage times.

3. Neglecting Pressure Losses: Overlooking friction and elevation changes can lead to

significant pressure drops, affecting system performance.

4. Non-compliance with Local Codes: Always verify that calculations align with local plumbing regulations to avoid legal issues.

Conclusion

In summary, the water service size calculation worksheet is an indispensable tool for ensuring that water supply systems are designed effectively and efficiently. By considering factors such as fixture units, flow rates, pressure losses, and compliance with local codes, professionals can accurately determine the appropriate water service line size. This meticulous approach not only enhances system performance but also contributes to the longevity and efficiency of plumbing systems. As water demand continues to rise, the importance of precise water service sizing will only increase, making the use of calculation worksheets an essential practice in the plumbing industry.

Frequently Asked Questions

What is a water service size calculation worksheet?

A water service size calculation worksheet is a tool used to determine the appropriate size of a water service line for a building based on factors such as fixtures, demand, and flow rate requirements.

Why is it important to calculate the correct water service size?

Calculating the correct water service size ensures adequate water pressure and flow for all plumbing fixtures, prevents pipe damage, and complies with local building codes.

What factors are considered in the water service size calculation?

Factors include the number of plumbing fixtures, peak demand, distance from the water source, and local regulations or guidelines.

How do you determine the peak demand for a water service size calculation?

Peak demand is determined by estimating the maximum simultaneous usage of water fixtures, often using fixture unit values assigned to each type of fixture.

Is there a standard method or formula for calculating

water service size?

Yes, there are standard methods, such as using the Uniform Plumbing Code (UPC) or International Plumbing Code (IPC), which provide formulas and tables for calculating water service sizes.

Can I use an online calculator for water service size calculations?

Yes, there are various online calculators available that can help estimate the water service size based on input parameters, but it's essential to cross-check with local codes.

What happens if the water service size is incorrectly calculated?

An incorrectly calculated water service size can lead to inadequate water supply, increased pressure on pipes, potential leaks, and legal issues with building inspections.

Are there any tools or software available to assist with water service size calculations?

Yes, there are specialized plumbing design software and mobile apps that can assist engineers and plumbers in performing accurate water service size calculations.

Water Service Size Calculation Worksheet

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