



**CHARLOTTE WATER DOMESTIC METER ASSEMBLY SELECTION GUIDELINES**

\*\*doesn't account for head loss\*\*

The following calculation methods shall be used to calculate domestic water demand flow:

- **Residential Developments (Single Family/Multi-Family)**
  - IAPMO (International Association of Plumbing and Mechanical Officials) Water Demand Calculator
- **Commercial Developments**
  - AWWA M-22 Manual

The following table shall be completed and included on all plan submittals including 1.5” and larger domestic water services:

<b><u>Domestic Water Demand Calculation Results:</u></b>			
	<u>Demand Flow (gpm)</u>	<u>Corresponding Meter</u> (CLT Water Meter Chart)	<u>Proposed Meter</u>
Meter - 1			
Meter - 2			
Meter - 3			

New Service Connection and System Development fees may be referenced in the “Service Connections” section of the Charlotte Water Website.

Backflow requirements may be referenced in the “Backflow Prevention” section of the Charlotte Water Website.

- Service line head loss from water main through backflow may be referenced in **AWWA M-22 – Third Edition – Figure 5-2.**
- Steps for determining pipe, meter and other fitting sizes may be referenced in **AWWA M-22 – Third Edition – Figure 5-3.**

Split service allowances:

- Split services are not allowed on 1-inch and larger short side services. Short side services 1-inch and larger shall connect directly to the public water main.
- Split services are not allowed from dedicated domestic service lines 1-inch and larger.
  - This includes, but not limited to, ultrasonic meters intended and sized for domestic use only.
- Split services are are allowed from combination fire/domestic service lines and dedicated fire lines.
  - This includes, but not limited to, ultrasonic meters intended and sized for both, domestic and fire use.

*\*\*Fire protection demand determinations are outside the scope of these guidelines and should be calculated appropriately by the design Engineer.*



*\*\*Service lines/meter locations subject to City Code/State requirements and CLT Water design standards and specifications.*

Select Meter in below chart that achieves calculated domestic demand flow per methods indicated above. Calculated demand flow shall not exceed selected maximum rate for continuous operations (gpm).

**DOMESTIC RESIDENTIAL/COMMERCIAL**

**DESIGN FOR:**

<b>Meter Size/Type</b>	<b><u>Safe Maximum Operating Capacity (gpm) (AWWA)</u></b>	<b><u>Maximum Rate for Continuous Operations (gpm) (AWWA/Manufacture Specs)</u></b>
4-inch FMCT w/1-inch	700	*15
6-inch FMCT w/1.5-inch	1600	*35
8-inch FMCT w/2-inch	2800	*40
10-inch FMCT w/2-inch	4400	*45
12-inch FMCT w/2-inch	4400	*45
1.5-inch Positive Displacement	**100	50
2-inch Positive Displacement	**160	80
3-inch Compound (Class II)	***350	175
4-inch Compound (Class II)	***600	300
3-inch Ultrasonic	500	500
6-inch Compound (Class II)	***1350	675
4-inch Ultrasonic	880	880
8-inch Compound (Class II)	***1600	900
6-inch Ultrasonic	1400	1400
8-inch Ultrasonic	2800	2800
10-inch Ultrasonic	4500	4500
12-inch Ultrasonic	5500	5500

\* FMCT Crossover Point

\*\* Operation at this flow rate should not exceed 10 percent of usage, or 2 hr in a 24-hr period

\*\*\* Safe maximum operating capacity is the maximum flow rate for intermittent service and should not exceed 33 percent usage (8hr/day)

- **1.5-inch minimum required for 6 or more multi-family units**
- **1-inch minimum required for 3 – 5 multi-family units (single parcel, i.e. triplex/quadrplex)**
- **5/8" may serve up to 2 units (single parcel, i.e. duplex)**



**Domestic Meter Sizing Examples:**

**Multi-Family Residential** (Use Latest Version [IAPMO Water Demand Calculator](#)):

40 Unit Complex with 40 2-Bath

2 Bath Units (40)

Fixture	Count
Combination Bath/Shower	80
Faucet, Lavatory	80
Water Closet, Gravity Tank	80
Dishwasher	40
Faucet, Kitchen Sink	40
Clothes Washer	40

- Peak Domestic Demand: **32.7 gpm**
  - Minimum Meter Size Options:
    - Dedicated Domestic Only (cannot split services)
      - 1.5-inch
    - Dedicated Fire
      - Fire line appropriately sized to meet fire flow demand
    - Domestic/Fire Combination (can split services)  
Note: Plumbing requires individual backflow preventers at private fire hydrants
      - Ultrasonic sized to meet fire flow demand
      - 6-inch or larger FMCT sized to meet fire flow demand



120 Unit Complex with 40 1-Bath, 40 2-Bath and 40 3-Bath

1 Bath Units (40)

Fixture	Count
Combination Bath/Shower	40
Faucet, Lavatory	40
Water Closet, Gravity Tank	40
Dishwasher	40
Faucet, Kitchen Sink	40
Clothes Washer	40

2 Bath Units (40)

Fixture	Count
Combination Bath/Shower	80
Faucet, Lavatory	80
Water Closet, Gravity Tank	80
Dishwasher	40
Faucet, Kitchen Sink	40
Clothes Washer	40

3 Bath Units (40)

Fixture	Count
Combination Bath/Shower	120
Faucet, Lavatory	120
Water Closet, Gravity Tank	120
Dishwasher	40
Faucet, Kitchen Sink	40
Clothes Washer	40

Total Units Served by meter

Fixture	Count
<b>Combination Bath/Shower</b>	<b>240</b>
<b>Faucet, Lavatory</b>	<b>240</b>
<b>Water Closet, Gravity Tank</b>	<b>240</b>
<b>Dishwasher</b>	<b>120</b>
<b>Faucet, Kitchen Sink</b>	<b>120</b>
<b>Clothes Washer</b>	<b>120</b>

- Peak Domestic Demand: **60.9 gpm**
  - Minimum Meter Size Options:
    - Dedicated Domestic Only (cannot split services)
      - 1.5-inch
    - Dedicated Fire
      - Fire line appropriately sized to meet fire flow demand
    - Domestic/Fire Combination (can split services)
      - Note: Plumbing requires individual backflow preventers at private fire hydrants
      - Ultrasonic sized to meet fire flow demand



500 Unit Complex with 200 2-Bath and 300 3-Bath

2 Bath Units (200)

Fixture	Count
Combination Bath/Shower	400
Faucet, Lavatory	400
Water Closet, Gravity Tank	400
Dishwasher	200
Faucet, Kitchen Sink	200
Clothes Washer	200

3 Bath Units (300)

Fixture	Count
Combination Bath/Shower	900
Faucet, Lavatory	900
Water Closet, Gravity Tank	900
Dishwasher	300
Faucet, Kitchen Sink	300
Clothes Washer	300

**Total Units Served by meter**

Fixture	Count
<b>Combination Bath/Shower</b>	<b>1300</b>
<b>Faucet, Lavatory</b>	<b>1300</b>
<b>Water Closet, Gravity Tank</b>	<b>1300</b>
<b>Dishwasher</b>	<b>500</b>
<b>Faucet, Kitchen Sink</b>	<b>500</b>
<b>Clothes Washer</b>	<b>500</b>

- Peak Domestic Demand: **177.3 gpm**
  - Minimum Meter Size Options:
    - Dedicated Domestic Only (cannot split services)
      - 3-inch Ultrasonic
      - 3-inch Compound
    - Dedicated Fire
      - Fire line appropriately sized to meet fire flow demand
    - Domestic/Fire Combination (can split services)
      - Note: Plumbing requires individual backflow preventers at private fire hydrants
      - Ultrasonic sized to meet fire flow demand
        - 3-inch Ultrasonic (minimum per domestic needs)



**Commercial** (Reference Latest Edition [AWWA – M22 Manual](#)):

- Peak Domestic Demand: **700 gpm**
  - Minimum Meter Size Options:
    - Dedicated Domestic (cannot split services)
      - 4-inch Ultrasonic
      - 6-inch Compound
    - Dedicated Fire
      - Fire line appropriately sized to meet fire flow demand
    - Domestic/Fire Combination (can split services)  
Note: Plumbing requires individual backflow preventers at private fire hydrants
      - Ultrasonic sized to meet fire flow demand
        - 4-inch Ultrasonic (minimum per domestic needs)

### **REQUENTLY ASKED QUESTIONS**

What is the purpose of domestic meter sizing guidelines?

- Starting July 1, 2021, Charlotte Water will offer ultrasonic meter installations for water services between 3 and 12-inches. Ultrasonic meters offer domestic and domestic/fire combination services through one single measuring device (no bypass meter). Charlotte Water’s Customer Service Team piloted a program for the replacement of aging large meter services as well as targeted replacements of FMCT’s that were being incorrectly used to supply domestic water through the fire-side service with ultrasonic meters. These ultrasonic meters provide increased accuracy in water demands and associated billing and are now ready for new water service installations. Because of the variety of meters now available, Charlotte Water Staff has provided guidance for those involved in sizing meters following the recommendations of AWWA standards. For questions regarding the guidance, please, reach out to Charlotte Water’s New Services Team: [CLTWaterNewServices@charlottenc.gov](mailto:CLTWaterNewServices@charlottenc.gov).

Why are maximum continuous operational rates so low for FMCT meters?

- The FMCT flow rates indicated in the chart are the points in which the crossover between the small meter and large meter begins. The crossover range increases incrementally for each FMCT. Meter reading accuracy is decreased by up to 15% when flow rates are within this crossover range.

What is an Ultrasonic Meter?

- A combination domestic/fire rated meter with a single body assembly. It’s extremely accurate with all-digital technology and no moving parts or crossover.