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SPECIFICATION: **G-8200-6**

TITLE: **SERVICE SIZING**

VOLUME: **2 (Section 12.0) and 4**

COURSE ID: **GAS5008**

★ **REQUIRED TRAINING GROUPS:** **Gas System Analysis, Gas System Planning, Gas Customer Connections Ops, Gas Customer Planning, All Gas Engineering Designers and Engineering Supervisors**

★ Each group listed is responsible for its own training which may be specific to a title/individual and not to the group in its entirety. Please check with your local training coordinator/department.

SUBSTANTIVE REVISIONS: (See ★)

1)	Cover Page	-	"Core Group" and "Target Audience" has been removed and replaced with "Required Training Groups to align with the new specification format.
2)	Section 2.0	-	Corrected section number from 2.3 to 2.2.
3)	Attachment(s): Tables 3-5	-	Updated Tables 3, 4, and 5 to reflect 2" MDT Tap sizes.

Gas Operations Standards

TITLE: SERVICE SIZING

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1.0 SCOPE

This specification provides guidelines for:

- Determining gas demand
- Selecting pipe sizes for new services
- Determining if an existing service is sized adequately for additional load.

2.0 DEFINITIONS

2.1 Connected gas load: the sum of the usage ratings for all customer gas equipment supplied by a service.

★ 2.2 Demand factor: a number, equal to or less than 1.0, used as a multiplier to calculate gas demand; it represents the maximum fraction of the total connected load that can be expected to burn gas at any time; also known as coincidence factor.

2.3 Gas demand: the highest gas flow rate expected on a service, the gas flow rate for which the service should be designed.

Gas demand = Connected load x Demand factor

3.0 GAS DEMAND

The gas demand on a service, as determined below, should be also used for selecting meters and service regulators (see Volume 3 Specification G-48, "Gas Meter and Service Regulator Sizing").

3.1 For new services, the connected gas load is available in a listing of customer gas equipment, including ratings (in cubic feet per hour, cfh) for each appliance; this information is submitted to Energy Services by the customer's licensed contractor or consultant via load letter submitted via internet website.

3.2 When equipment ratings are not available from a Work Request Form, use equipment nameplate ratings; or for residential customers, the following table can be used to estimate the gas demand.

3.0 **GAS DEMAND** (Continued)

Gas Equipment	Cubic Feet per Hour
Stove	30
Water Heater	40
Clothes Dryer	20
Space Heating	20 per room
Fireplace	30

3.3 For residential buildings, demand factors for stoves and clothes dryers are shown on attached Table 2.

3.4 For central space heating and water heating equipment, the demand factor = 1.0, except:

A) Where there are multiple boilers and one or more units are identified as back-ups (stand-by). Connected gas load for back-up equipment need not be included in maximum gas load figure when sizing service piping, meters or service regulators.

B) For multi-unit buildings, where there is individual space heating equipment and/or hot water heaters for each unit, demand factors are shown on attached Table 1.

3.5 For restaurant/commercial cooking equipment, use demand factors as follows:

- For first 500 cfh of connected load, demand factor = 1.0
- For connected load greater than 500 cfh, demand factor = 0.6

3.0 **GAS DEMAND** (Continued)

3.5 (Continued)

For example - if a restaurant's cooking equipment total connected load is 1500 cfh

			Demand Factor		
First 500 cfh	500 cfh	x	1	=	500 cfh
Load greater than 500 cfh	1000 cfh	x	0.6	=	600 cfh
For sizing purposes, maximum cooking load				=	1100 cfh

3.6 For commercial laundromats, use a demand factor of 0.75 for any number of units greater than 1. For clothes dryers in multi-dwelling residential buildings, use the demand factor as determined in Table 2.

3.7 For air conditioning gas demand, the calculated design gas demand should not consider coincidental heat and air conditioning load under design conditions. However, the service must be sized for the greater of the summer or winter load condition

3.8 For determining total diversified heating loads, the use of multiple boilers as backup units (stand-by only) as well as lead lag boilers must be considered in the calculation of demand loads.

4.0 NEW SERVICE PIPE SIZING

4.1 The following pipe sizes are the smallest to be used for new direct bury service installations (Contact Gas Engineering if < 2" LP or IP service is required):

System Pressure	Minimum Pipe Size	
	Steel	Plastic
Low or Intermediate	2"	2" IPS
Medium	1"	1¼" IPS
High	1"	1" IPS

Note: For LP plastic insertions smaller than 2", see G-8100.

4.2 The use of plastic tubing shall be limited as follows:

A) 1 1/4" CTS shall not be installed on any high pressure system (80 or 99 psig design).

B) 1" CTS shall not be installed on any high pressure system (99 psig design).

4.3 Service pipe sizes shall be selected to provide capacity greater than or equal to the customer's demand. Tables 3 through 5 provide gas flow rate capacities for various system pressures, pipe materials, sizes and lengths.

4.4 Capacities shown in Tables 3 through 5 were calculated using Allowable Pressure Drop shown below. These values should be used for new service installations not covered in the tables.

System Pressure	Allowable Pressure Drop
Low & Intermediate	1/2" WC
Medium	1 psig
High	5 psig

4.5 For installations where the Allowable Pressure Drops cannot be achieved, contact Gas Distribution Planning for approval.

5.0 DETERMINING ADEQUACY OF EXISTING SERVICES FOR ADDITIONAL LOAD

5.1 Gas Engineering should be consulted to determine if an existing service is adequate when added gas load brings the new demand to a total greater than the capacities listed in Tables 3 through 5. These determinations require informed judgment regarding the main size supplying the service, distance from a regulator station supplying the system, large spot loads in the vicinity and reviewing available pressures records.

5.2 Generally, the maximum allowable pressure drop for an existing service with additional load should be limited as per the table below.

System Pressure	Allowable Pressure Drop
Low & Intermediate	1/2" WC
Medium	1 psig
High	5 psig

5.3 For existing plastic and coated steel services, where the Allowable Pressure Drops cannot be achieved or where a pressure drop greater than ½" WC but less than 1" WC contact Gas Engineering New Business or System Reliability Group for approval.

6.0 RECORDS RETENTION

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

7.0 REFERENCES

G-48	Meter and Service Regulator Sizing
G-8100	General Specification For The Installation Of Gas Distribution Services
CI-870-1	Records Management

8.0 ATTACHMENTS

Table 1	Demand Factors for Individual Space or Water Heating Units in Multi-Tenant Buildings
Table 2	Demand Factors for Stoves, Fireplaces and Clothes Dryers in Multi-Dwelling Residential Buildings
Table 3	Service Capacities (CFH) Low (4" to 12" wc) and Intermediate Pressure (>1 to 5 psig) (Ossining) Systems
Table 4	Service Capacities (CFH) Medium Pressure Systems – 2 to 15 PSIG
Table 5	Service Capacities (CFH) High Pressure Systems – 15 to 99 PSIG

Table 1

Demand Factors
for Individual Space or Water Heating Units
in Multi-Tenant Buildings

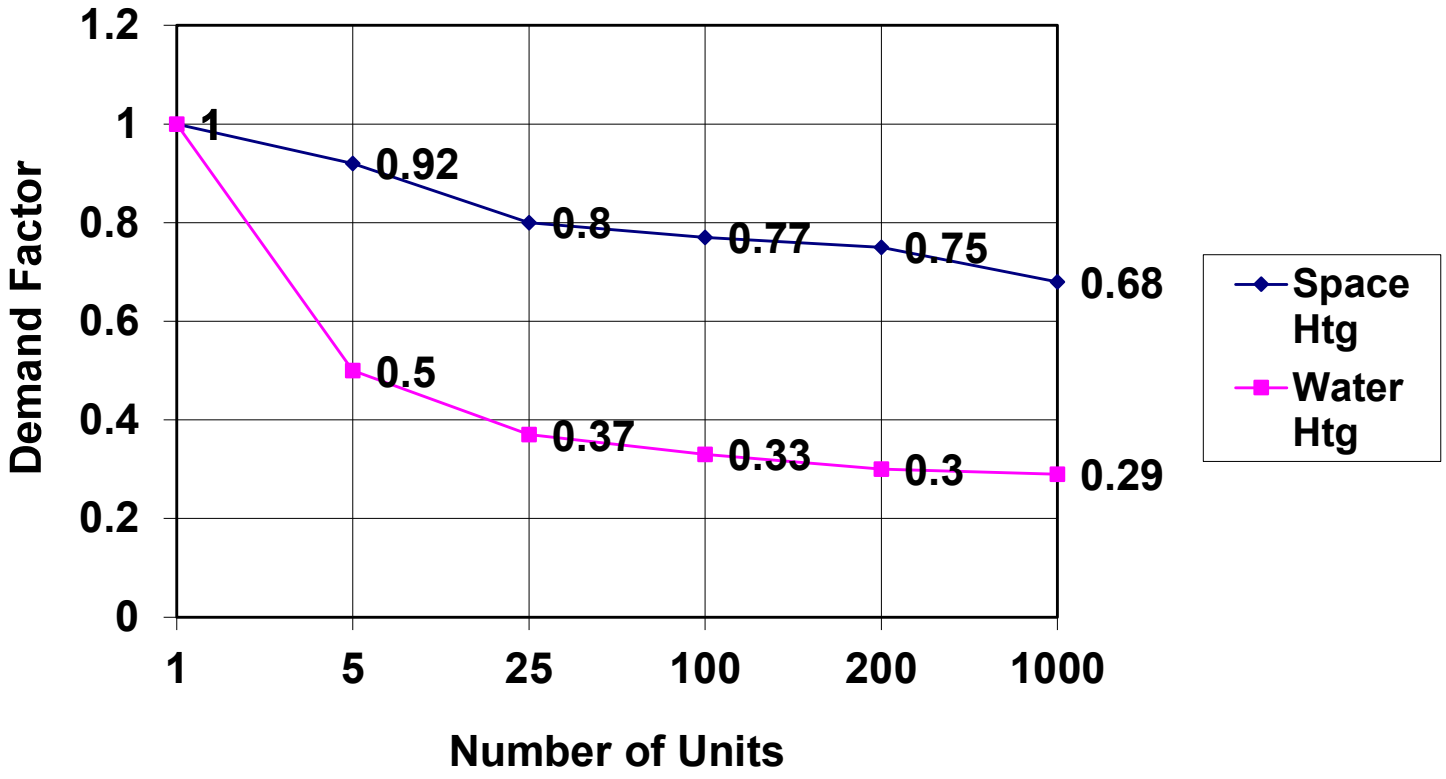
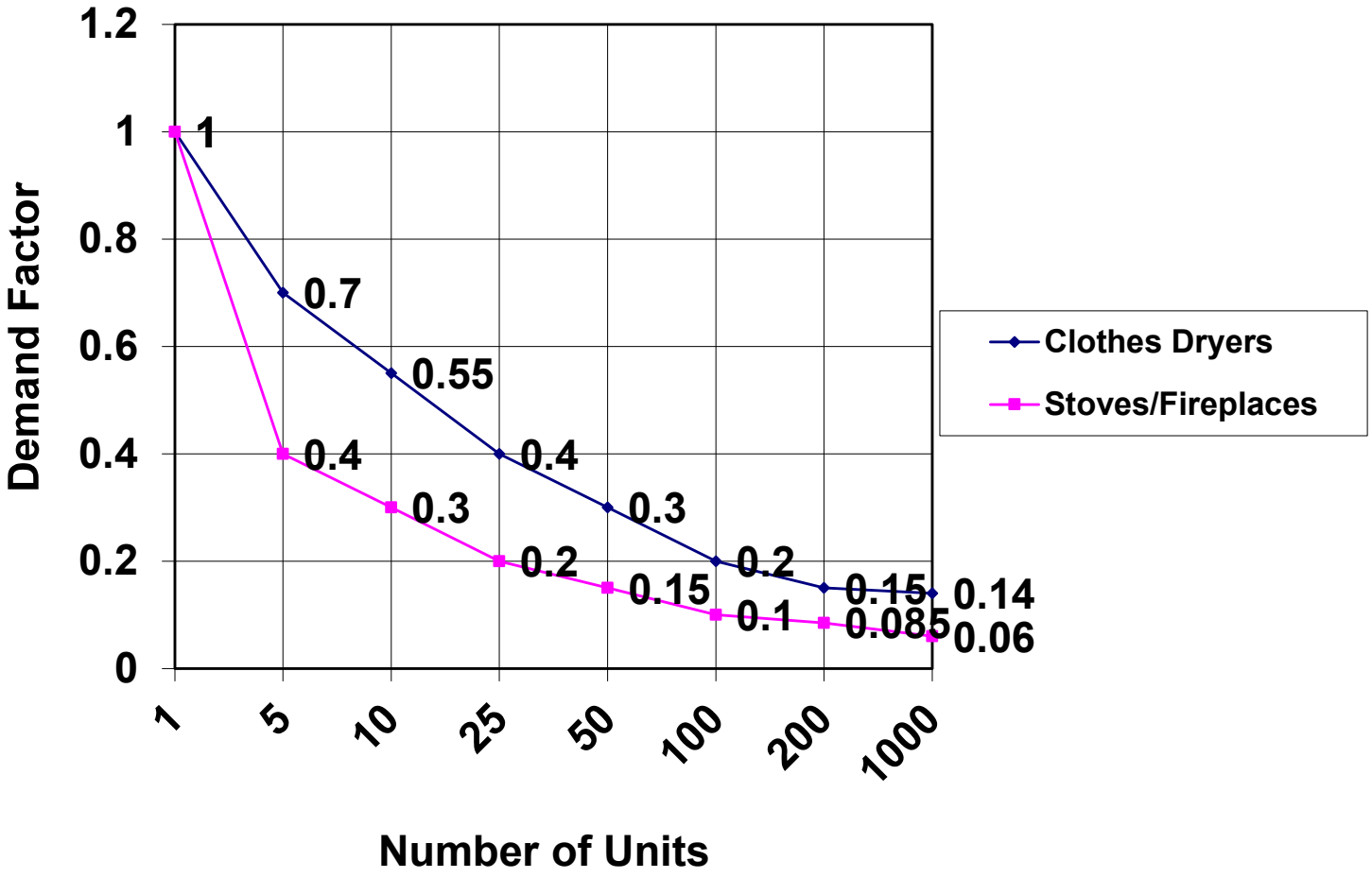


Table 2

Demand Factors for Stoves, Fireplaces and Clothes Dryers In Multi-Dwelling Residential Buildings



★ Table 3

Service Capacities (cfh)
Low (4" to 12" WC) and Intermediate Pressure (>1 to 5 psig)
(Ossining) Systems

NOTE: Main to building length in the tables below allowance for curb valve and head of service valve only. **Contact Gas Engineering if these minimum tap hole sizes cannot be achieved.**

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PLASTIC	**Pipe Size / Capacity**										
Main to Bldg Length	**1" CTS***	**1" IPS ***	**1-1/4" CTS***	**1-1/4" IPS***	**2"**	**2" 12"x2"**	**2" 16"x2"**	**3"**	**4"**	**6"**	**8"**
	.75" Tap	.75" Tap	.75" Tap	.75" Tap	1.18" Tap	1.771" Tap	1.811" Tap	2.25" Tap	3" Tap	4.44" Tap	6.5" Tap
Up to 30'	176	202	227	239	589	1,101	1,120	2,290	4,160	9,799	20,182
31' – 60'	140	169	199	220	545	894	905	2,011	3,706	8,987	18,455
61' – 100'	113	143	173	200	500	736	743	1,754	3,273	8,150	16,691
101' – 150'	94	122	150	181	455	619	623	1,535	2,892	7,358	15,036
151' – 200'	81	108	135	167	420	542	545	1,378	2,613	6,750	13,772

***** Do not use for new direct bury service installations. 2" IPS should be the minimum size for new plastic services.

STEEL	**Pipe Size / Capacity**							
Main to Bldg Length	**1" ***	**1-1/4" ***	**1-1/2" ***	**2"**	**3"**	**4"**	**6"**	**8"**
	.75" Tap	1" Tap	1" Tap	1.5" Tap	2.5" Tap	3.5" Tap	5.5" Tap	7.5" Tap
Up to 30'	202	392	429	900	2,849	5,596	14,380	26,590
31' – 60'	167	330	387	800	2,483	4,929	13,018	24,498
61' – 100'	139	278	346	706	2,154	4,312	11,662	22,316
101' – 150'	117	238	308	623	1,876	3,780	10,422	20,230
151' – 200'	104	211	280	563	1,679	3,398	9,491	18,612

***** Do not use for new direct bury service installations. 2" should be the minimum size for new steel services.

COPPER	**Pipe Size / Capacity**	
Main to Bldg Length	**1"**	**1-1/4"**
	.75" Tap	1" Tap
Up to 30'	300	440
31' – 60'	230	360
61' – 100'	190	300
101' – 150'	150	250
151' – 200'	130	200

★ Table 4

Service Capacities (cfh)
Medium Pressure Systems
2 to 15 psig

NOTE: Main to building length in the tables below allowance for curb valve and head of service valve only**. Contact Gas Engineering if these minimum tap hole sizes cannot be achieved.**

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PLASTIC	**Pipe Size / Capacity**					
Main to Bldg Length	**1/2" CTS ***	**1" IPS ***	**1-1/4 IPS**	**2" IPS**	**2" 12"x2"**	**2" 16"x2"**
	.75" Tap	.75" Tap	.75" Tap	1.18" Tap	1.771" Tap	1.811" Tap
Up to 30'	349	2,285	2,704	6,675	11,831	12,035
31' – 60'	248	1,922	2,488	6,185	9,606	9,719
61' – 100'	190	1,622	2,264	5,666	7,915	7,980
101' – 150'	153	1,384	2,049	5,162	6,650	6,690
151' – 200'	131	1,224	1,885	4,766	5,826	5,853

*****Do not use for new direct bury services. 1-1/4" IPS is the minimum size for new MP plastic services. ½" CTS, shall only be used on service insertions after approval from Gas Engineering.

STEEL	**Pipe Size / Capacity**			
Main to Bldg Length	**1" (Auto-Perf)**	**1"**	**1-1/2"**	**2"**
	.375" Tap	.75" Tap	1" Tap	1.5" Tap ★
Up to 30'	622	2,284	4,946	10,202
31' – 60'	608	1,886	4,446	9,075
61' – 100'	592	1,571	3,957	8,005
101' – 150'	573	1,330	3,518	7,063
151' – 200'	555	1,170	3,192	6,377

COPPER	**Pipe Size / Capacity**			
Main to Bldg Length	**1/2"**	**3/4"**	**1"**	**1-1/4"**
	.75" Tap	.75" Tap	.75" Tap	1" Tap
Up to 30'	825	1,050	2,750	4,100
31' – 60'	670	875	2,150	3,400
61' – 100'	550	725	1,700	2,850
101' – 150'	450	625	1,400	2,400
151' – 200'	400	550	1,250	2,150

★ Table 5

Service Capacities (cfh)
High Pressure Systems
15 to 99 psig

NOTE: Main to building length in the tables below allowance for curb valve and head of service valve only**. Contact Gas Engineering if these minimum tap hole sizes cannot be achieved.**

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PLASTIC	Pipe Size / Capacity					
Main to Bldg Length	**1/2" CTS ***	**1" IPS**	**1-1/4 IPS**	**2" IPS**	**2" 12"x2"**	**2" 16"x2"**
	.75" Tap	.75" Tap	.75" Tap	1.18" Tap	1.771" Tap	1.811" Tap
Up to 30'	1,336	8,744	10,468	27,049	47,832	48,658
31' – 60'	947	7,352	9,617	24,871	38,837	39,294
61' – 100'	725	6,205	8,735	22,610	32,000	32,264
101' – 150'	584	5,297	7,899	20,461	26,887	27,049
151' – 200'	500	4,684	7,254	18,799	23,553	23,665

***** Do not use for <u>new</u> direct bury services. 1" IPS is the minimum size for new HP plastic services.

STEEL	Pipe Size / Capacity			
Main to Bldg Length	**1" (Auto-Perf)**	**1"**	**1-1/2"**	**2"**
	.375" Tap	.75" Tap	1" Tap	1.5" Tap
Up to 30'	2,379	8,738	18,632	39,033
31' – 60'	2,328	7,216	16,793	34,721
61' – 100'	2,264	6,013	14,986	30,627
101' – 150'	2,192	5,090	13,348	27,023
151' – 200'	2,126	4,478	12,128	24,400

COPPER	Pipe Size / Capacity			
Main to Bldg Length	**1/2"**	**3/4"**	**1"**	**1-1/4"**
	.75" Tap	.75" Tap	.75" Tap	1" Tap
Up to 30'	2,500	3,200	8,500	12,700
31' – 60'	2,000	2,650	6,600	10,500
61' – 100'	1,650	2,200	5,300	8,750
101' – 150'	1,400	1,900	4,400	7,450
151' – 200'	1,200	1,700	3,800	6,550