March 26, 2021

Mr. John Prince
Delane Engineering- Owner
San Diego Mission Valley High Rise Hotel
4909 Murphy Canyon Rd. #330
San Diego, CA 92123

SUBJECT: San Diego Mission Valley High Rise Hotel Water System Analyses Technical Document

Dear John,

This technical document serves as the Water System Analyses for the San Diego Mission Valley High Rise Hotel onsite water systems Project. The purpose of this study is to verify potable and fire water demand for the Project and to analyze onsite systems for adequate pressure and flow to every fixture at all times. This will ensure that Health, Safety and Noise considerations will be taken into account.

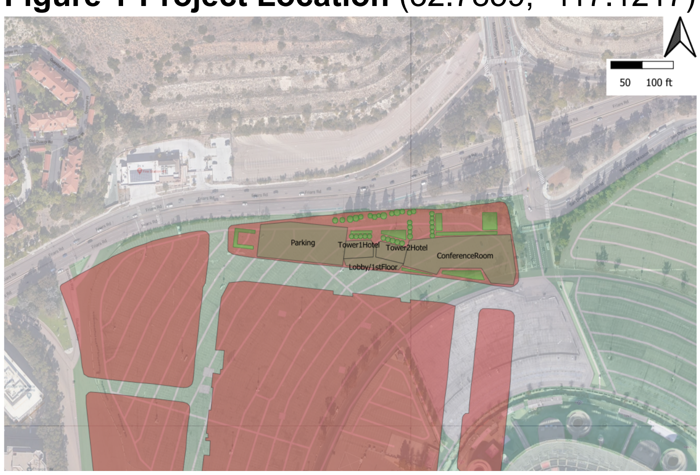
Project Background

The project is in the mission valley area at 9449 Friars Rd. San Diego CA, 92108. It is the former location of Qualcomm/ Aztec Stadium and is currently serving as an additional parking lot for the SDSU West Project. The 3.8 acre area will eventually become a 9 story hotel that includes a conference room and a parking structure.

SDSU West will serve higher education, the public good, and the community's goals and aspirations including NCAA Division 1 sports. This new construction has prompted the need for a thorough study of the projected onsite water systems.

See **Figure 1** for Project Location

Figure 1-Project Location (32.7859, -117.1217)



Existing Water Service

The Project is located within the SDSU West master plan. Potable service for the area is provided by the Lake Murray Treatment Plant, located along Lake Murray Road to the North East of the Project location. The anticipated hydraulic grade line of the Project is 81 feet, as provided by the grading plans and boring logs provided to Centaur Solutions.

The campus will have separate potable and fire systems.

Figure 2 Existing Water Service (POC TBD)

Potable Water Service

The onsite potable water system use includes drinking, cooking, toilet flushing, (pool filling), and bathroom services. Existing public service lines along Friars Rd. and Road (b) currently provide service to the entire SDSU West site along with backflow prevention. A separate 2" meter with backflow protection will be installed along Road (a), to supply the hotel, conference room, and parking structure demand.

See **Figure 2** for existing potable layouts surrounding the Project.

Design Criteria

Design criteria for the potable water systems are per the City's Design Guidelines, as presented in **Table 1**.

Table 1- Design Criteria

Parameter	Potable Water Criteria
Fire Flow	Min 1500 gpm (need to size)

Minimum Static Pressure	65 psi
Minimum Pressure, MDD + Fire	20 psi
Minimum Pressure, Peak Hour	40 psi
Maximum Pressure Drop	25 psi
Maximum Velocity, MDD + Fire	15 fps
Maximum Velocity, Peak Hour	8 fps

Water Demand

Potable Water Demand

The use of fixture units to project peak water demand can be performed on a building to building basis. This methodology, described in the California Plumbing Code (CPC), utilizes the total number of plumbing fixtures (hot and cold) to determine the peak flow to a building. The relationship between fixture units and peak flow per the CPC is provided in (Appendix A). This method is used to size the meter and laterals into a single building. Proper procedure for this methodology is to sum the total amount of fixtures for the building to determine the total peak flow. (See Appendix A).

Based on the calculations and appendix the hotel will require a 2” meter and a 2.5” supply line to supply a peak demand of 468 gpm. Since the hotel is being sized by CPC fixture methodology it is not warranted to calculate future demand unless the building is enlarged.

Fire Water Demand

The hotel will require its own separate fire flow based on building square footage and construction type per the California Fire Code (CFC) requirements. (See Appendix B.) The system will be connected with backflow preventers from connections to the existing City of San Diego public system. Done by April 6th, 2021

Initial Assumptions

1) The 1st level floor is at 0 feet in height and approx 81 feet in elevation (from boring log initial bore height).
2) The 1st level ceiling is 20 feet in height above the 1st level floor and approx 101 feet in elevation.
3) The 2nd level floor and 1st level ceiling are equal in height and elevation.
4) Each subsequent level is 10 feet of height above the prior which reaches the roof at 9th level ceiling.

5) An additional 3 feet is assumed to be the last fixture height on the roof and will be used as the governing fixture (hose bib).
6) Levels 2-9 are to be 13,000 square feet and will contain 330 square foot rooms (Standard size off google) and therefore contain 40 rooms per level. For a total of 320 rooms.
7) Each room shall contain one wash closet, one lavatory, and one bath/shower combination.
8) Each level (1-9) shall contain one Mop Basin or Service Sink
9) Level 1 shall contain a 2000 square foot lobby area with 8 wash closets, 6 lavatories, and 4 urinals
10) Level 1 shall contain a fitness area and Locker containing 6 shower heads and 4 lavatories
11) A Mechanical Equipment Room (MER) shall be installed on the 4th level to have approximately 200gpm pumped (See Appendix B for recommended product) to levels 5 through 9.
12) The total fixture height shall be 103 feet in height and 184 feet in elevation for the governing fixture

Recommendations

1) Centaur Solutions recommends purchasing an Omni C^2 2” meter, a Watts Series 009 reduced pressure assembly backflow prevention device, 2 Watts LF223 High Capacity Water Pressure regulator valves and a Bell and Gossett Series e-80 In-Line Centrifugal Pump pump (See Appendix C for specification sheets).
2) A 2 ½” main pipe will serve a peak demand of 468 gpm based on CPC fixture sizing (See Appendix A)
3) Fire Demand Recommendations by April 6th, 2021 (See Appendix B)
4) Fire Demand Recommendations by April 6th, 2021 (See Appendix B)

If there is any questions or comments, please feel free to contact Centaur Solutions at 619-706-8484

Sincerely,

Centaur Solutions
Corey Hutchison, E.I.T.

Appendix A

Water Calculations and Rationale

Workload Narrative

Calculations are based on “California Plumbing Code 2019: Adopts with Amendments UPC 2018”. **Table 4** was put together using Appendix A “Recommended Rules for Sizing the Water Supply System” of the CPC A103.0 Demand Load and A105.0 Size of Building Supply. Using this rationale, it was determined that the peak demand should be calculated using 3319 fixture units, based on 320 bathtub or combo bath/shr, 10 hose bibbs, 320 lavatories, 10 mob basins, 6 showers, 4 urinals flushometer, 328 water closets flushometer (See Table 4- “Table A103.1 Water Supply Fixture Units CPC”). Using the 3319 fixture units on the x axis of **Chart 1**- “A103.1 (1) Estimate Curves for Demand Load CPC” , the peak demand can be estimated to be around 450 gpm or more precisely 468 gpm.
Water calculations using the 468 gpm were calculated in **Table 5**- “Water Calculations”. Using hazen williams and bernoulli's equations. It was assumed that there was very little head loss through the meter and the backflow however the water softener was assumed to have a pressure reduction of approximately 15 psig. It was also assumed that a hydrant test was performed and that the test showed a consistent static pressure of 85 psig at 1500 gpm, this particular set up will require a pressure regulator valve set at a pressure rating of 80 psig because of Chapter 6 Water Supply and Distribution 608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves states that pressure entering a building cannot exceed 80 psig.
Water Calculations also showed that a booster pump will be required to deliver approximately 200 gpm of water to floors 5-9 because of a -22 psig pressure drop available for design, however another pressure regulator valve will need to be installed to ensure that the water pressure does not exceed 80 psig after the booster pump.
See **Diagram 1** for specifications and placement of equipment.

Table 4- Table A103.1 Water Supply Fixture Units CPC

Individual Fixtures	F.U.			Fixtures Added				
	Pri.	Pub.	Ass.	Pri.	Pub.	Ass.	Total	
Bathtub or Combination Bath/Shr	4	4	-	320			1,280.00	
3/4" Bathtub Fill Valve	10	10	-				-	
Bidet	1	-	-				-	
Clothes Washer, domestic	4	4	-				-	
Dental Unit, cuspidor		1	-				-	
Dishwasher, domestic	1.5	1.5	-				-	
Drinking Fountain or Water Cooler	0.5	0.5	0.75				-	
Hose Bibb	2.5	2.5	-		10		25	
Hose Bibb, each additional	1	1	-				-	
Lavatory	1	1	1	320			320	
Lawn Sprinkler, each head	1	1	-				-	
Mobile Home, each (Minimum)	12	-	-				-	
Sinks- Bar	1	2	-				-	
Clinic Faucet Sink	-	3	-				-	
Clinic Flushometer Valve faucet	-	8	-				-	
Kitchen Sink, domestic	1.5	1.5	-				-	
Laundry Sink	1.5	1.5	-				-	
Service Sink or Mop Basin	1.5	3	-		10		30	
Washup Sink, each set of faucets	-	2	-				-	
Shower, per head	2	2	-		6		12	
Urinal, 1.0 GPF Flushometer Valve	-	3	4		4		12	
Urinal, grat than 1.0 GPF Flush V.	-	5	6				-	
Urinal, flush tank	2	2	3				-	
Washfountain, circular spray	-	4	-				-	
Wtr Closet, 1.6 GPF Gravity Tank	2.5	2.5	3.5				-	
Wtr Closet, 1.6 GPF Flushomtr Tank	2.5	2.5	3.5				-	
Wtr Clset, 1.6 GPF Flushomtr Valve	5	5	6	320	8		1,640.00	
Wtr Clset, >1.6 GPF Gravity Tank	3	5.5	7				-	
Wtr Clset, >1.6 GPF Flushomtr Valve	7	8	10				-	
Fixture Unit Subtotal				New			3,319.00	
Fixture Unit Total				Fixture Unit =			3,319.00	
Other Water Requirements				Fixture Unit =				
Existing Water Requirements				Fixture Unit =				
Total Water Requirements				Fixture Unit =			3,319.00	
Approved Meter Size							2	"
Water supply Line Size							2-1/2	"

	Gallons Per Minute (GPM) =	468	
	Gallons Per Minute (GPM) =		
	Gallons Per Minute (GPM) =		
	Gallons Per Minute (GPM) =	468	
Total Lengths	Total Lengths	500	ft.

Chart 1- A103.1 (1) Estimate Curves for Demand Load CPC

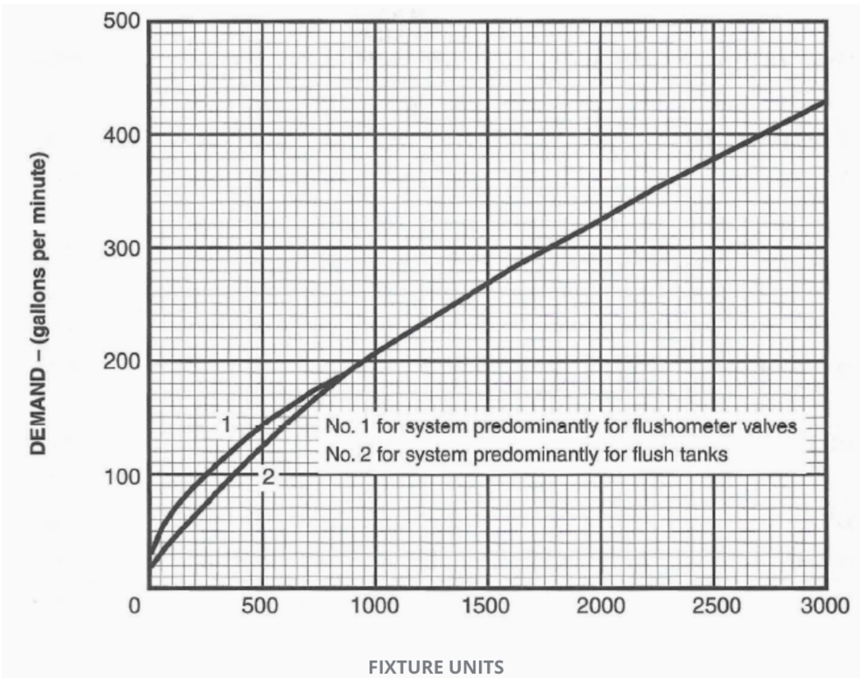


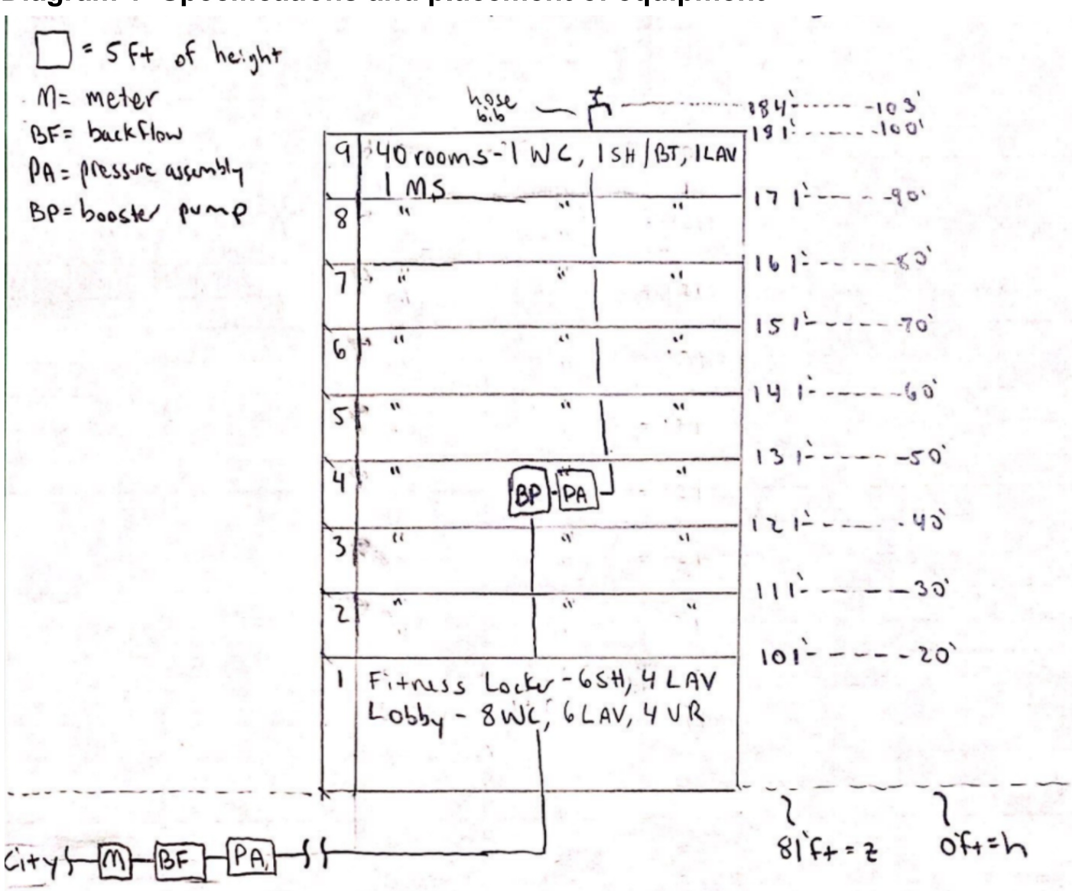
Table 5- Water Calculations

WATER CALCULATIONS			
Input data into green hi-lited spaces			
Building Data:			
First Floor Elevation:		0	Ft
Elevation of highest fixture:		103	Ft
Maximum Run of Pipe:		200	FT
Fixture Height:		103	FT
City Data:			
Hydrant location/No:			
Hydrant elevation:		3	Ft
Static Pressure Reading at Hydrant:		85	psig
Residual Pressure Reading at Hydrant:		80	psig
Test Flow:		1500	gpm
Calculation:			
GPM Demand at Building		468	gpm
Pressure at Building:		84.7	psig
Pressure Regulator:	REQUIRED		
Pressure Regulator Setting:		80	psig
Pressure Regulator Fall Off Pressure:		13	psig

Table 5- Water Calculations (Cont.)

Pressure Loss Through Meter:			0	psig
Pressure Loss Through Backflow Preventer:			0	psig
Pressure Loss Through Water Softener:			15	psig
Meter to Highest Fixture (Fixt. Ht.. x .43 psi/ft):			44.29	psig
Residual Pressure Required at Furthest Fixture:			30	psig
Pressure Drop Available For Design:			-22	psig
Pressure Boost:		REQUIRED		
Pressure Boost Provided:			10	psig
Pump Discharge Pressure:			94.7	psig
Adjusted Pressure Drop Available for Design:			20	psig
Adjusted Length of Pipe (Maximum Run x1.35):			270	ft
Allowable Maximum Friction Loss per 100ft of Pipe:			7.6	psig
Pressure Drop Available x 100				
Maximum Run of Pipe				
equivalent pipe length factor		=	1.35	
(increase factor if large quantity of offsets or fittings are used)				
1	to	50	3	
51	to	100	1.5	
101	to	250	1.35	
251	to	500	1.2	
501	to	750	1.1	

Diagram 1- Specifications and placement of equipment



Appendix B

Fire Demand and Rationale

Workload Narrative

Done by April 6th, 2021

Appendix C

Recommended Equipment

Recommended Meter

OMNI-412-R1

OMNI™ C²

2" OMNI C² Meter

DESCRIPTION

Model: The OMNI C² meter operation is based on advanced Floating Ball Technology (FBT) with an operating range of .25 GPM (.06 m³/hr) @ 95% min. to 200 GPM (45 m³/hr) @ 100% +/- 1.5% registration of actual throughput. The meter is also rated for continuous flows up to 160 GPM (36 m³/hr).

Conformance to Standards: The OMNI C² meter meets and far exceeds the most recent revision of ANSI / AWWA Standard C701 and C702 class II. Additionally, the meter does not require a valve to meet these standards. Each meter is performance tested to ensure compliance. All OMNI meters are NSF Approved to the latest standards.

Performance: The patented measurement principles of the OMNI C² meter assure enhanced accuracy ranges, an overall greater accuracy, and a longer service life than any other comparable class meter produced. The C² meter has no restrictions as to sustained flow rates within its continuous operating range. The floating ball measurement technology allows for flows up to its rated maximum capacity without undue wear or accuracy degradation.

Construction: The C² meter consists of two basic assemblies; the maincase and the measuring chamber. The measuring chamber assembly includes the "floating ball" impeller with a coated titanium shaft, hybrid axial bearings, integral flow straightener and an all electronic programmable register with protective bonnet. The maincase is made from industry proven Ductile Iron with an approved NSF epoxy coating. Maincase features are; easily removable measuring chamber, unique chamber seal to the maincase using a high pressure o-ring, testing port and a convenient integral strainer.

OMNI Electronic Register: The C² electronic register is hermetically sealed with electronic pickup containing no mechanical gearing. The large character LCD displays AMR, Totalization and a Resettable Test Totalizer. OMNI register features; AMR resolution units that are fully programmable, Pulse output frequency that are fully programmable, Integral customer data logging capability, Integral resettable accuracy testing feature compatible with AR-5000 Testing Assistant Program, Large, easy-to-read LCD also displays both forward and reverse flow directions and all with a 10-year battery life guarantee.

Magnetic Drive: Meter registration is achieved by utilizing a fully magnetic pickup system. This is accomplished by the magnetic actions of the embedded rotor magnets and the ultra sensitive register pickup probe. The only moving component in water is the "floating ball" impeller.

2" OMNI C²

AMR/AMI Mode | Totalization Mode | Resettable Test Mode

Measuring Element: The revolutionary thermoplastic, hydrodynamically balanced impeller floats between the bearings. The Floating Ball Technology (FBT) allows the measuring element to operate virtually without friction or wear, thus creating the extended upper and lower flow ranges capable on only the OMNI C² meter.

Strainer: The OMNI C² with the "V" shaped integral strainer using a stainless steel screen along with Floating Ball Technology (FBT) create a design that gives far improved accuracy even in those once thought questionable settings. A removable strainer cover permits easy access to the screen for routine maintenance.

Maintenance: The OMNI C² meter is designed for easy maintenance. Should any maintenance be required, the measuring chamber and / or strainer cover can be removed independently. Parts and or a replacement measuring chamber may be utilized in the event repairs are needed. Replacement and Measuring Chamber Exchange are available under the Sensus MMP Program for the C² meters and this program may also be utilized for retrofitting to competitive meters to achieve increased accuracy and extended service life.

AMR / AMI Systems: Meters and encoders are compatible with current Sensus AMR/AMI systems.

Guarantee: Sensus OMNI C² Meters are backed by "The Sensus Guarantee." Ask your Sensus representative for details or see Bulletin G-500.

Recommended Backflow Preventer

Series 009

Reduced Pressure Zone Assemblies

Sizes: ¼" – 3" (8 – 80mm)

Series 009 Reduced Pressure Zone Assemblies are designed to protect potable water supplies in accordance with national plumbing codes and water authority requirements. This series can be used in a variety of installations, including the prevention of health hazard cross connections in piping systems or for containment at the service line entrance.

This series features two in-line, independent check valves, captured springs and replaceable check seats with an intermediate relief valve. Its compact modular design facilitates easy maintenance and assembly access. Sizes ¼" – 1" (8 – 25mm) shutoffs have tee handles.

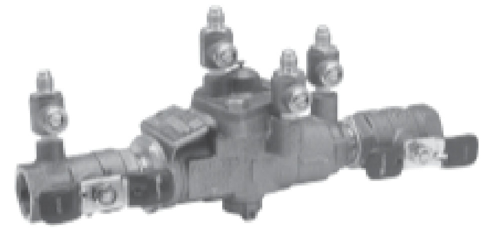
Features

- Single access cover and modular check construction for ease of maintenance
- Top entry - all internals immediately accessible
- Captured springs for safe maintenance
- Internal relief valve for reduced installation clearances
- Replaceable seats for economical repair
- Bronze body construction for durability ¼" – 2" (8 – 50mm)
- Fused epoxy coated cast iron body 2½" and 3" (65 and 80mm)
- Ball valve test cocks — screwdriver slotted ¼" – 2" (8 – 50mm)
- Large body passages provides low pressure drop
- Compact, space saving design
- No special tools required for servicing

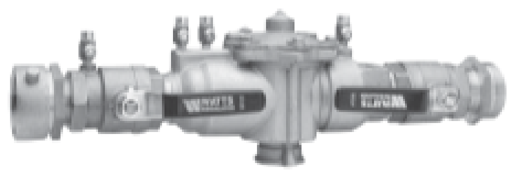
Specifications

A Reduced Pressure Zone Assembly shall be installed at each potential health hazard location to prevent backflow due to backsiphonage and/or backpressure. The assembly shall consist of an internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in both check modules and the relief valve. There shall be no threads or screws in the waterway exposed to line fluids. Service of all internal components shall be through a single access bronze cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves, four resilient seated test cocks and an air gap drain fitting. The assembly shall meet the requirements of: USC Manual 8th Edition†; ASSE Std. 1013; AWWA Std. C511; CSA B64.4. Shall be a Watts Regulator Co. Series 009.

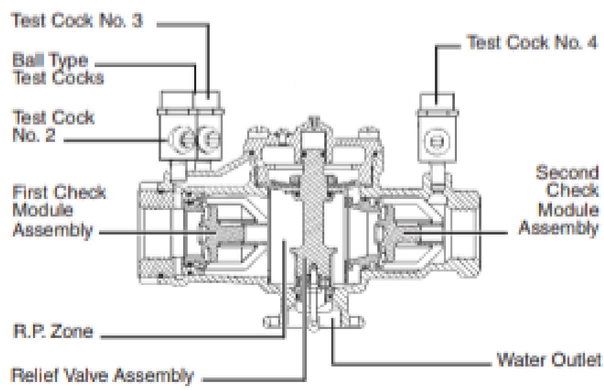
†Does not indicate approval status. Refer to Page 2 for approved sizes & models.



½" (15mm) 009QT



2" (50mm) 009M2QTHC



Now Available
WattsBox Insulated Enclosures.
For more information, send for literature ES-WB.

***IMPORTANT:** INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS*

WATTS®

Recommended Pressure Regulator Valve

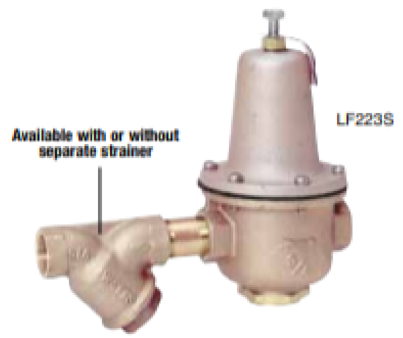
Job Name ______________	Contractor ______________
Job Location ______________	Approval ______________
Engineer ______________	Contractor's P.O. No. ______________
Approval ______________	Representative ______________

LEAD FREE*

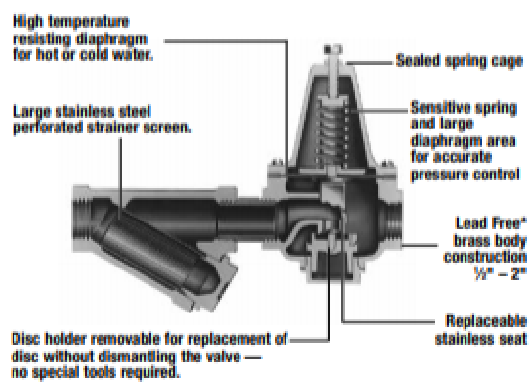
Series LF223, LF223S

High Capacity Water Pressure Reducing Valves**

Sizes: ½" – 2½"



Series LF223 and LF223S High Capacity Water Pressure Reducing Valves are designed to reduce incoming water pressure to a sensible level to protect plumbing system components and reduce water consumption. The LF223/LF223S features Lead Free* construction to comply with Lead Free* installation requirements. This series is suitable for water supply pressures up to 300psi (20.7 bar) and may be adjusted from 25 – 75psi (172 – 517 kPa). The standard setting is 50psi (345 kPa). Series LF223 features an enlarged diaphragm, spring cage and seat orifice for high capacity performance. Series LF223S has the same options as the LF223, except it is furnished with a strainer. All parts are quickly and easily serviceable without removing the valve from the line. The optional bypass feature permits the flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main supply.



Features

- Enlarged diaphragm, spring cage and seat orifice for super capacity performance
- Lead Free* brass body construction (except 2½" which is iron)
- Serviceable in line
- Series LF223S furnished with separate strainer
- Optional bypass feature controls thermal expansion pressure***
- Sealed spring cage on all models for accessible outdoor or pit installations.

Models

LF223	NPT threaded female inlet x NPT threaded female outlet
LF223-S	NPT threaded female inlet with strainer x NPT threaded female outlet

For 2½" – 3" bronze threaded valves, refer to literature ES-LFN223B.

For 3" flanged connections, refer to literature ES-LFN223F.

***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

****A water saving test program concluded that reducing the supply pressure from 80-50psi (551-345 kPa) resulted in a water savings of 30%.**

*****The bypass feature will not prevent the pressure relief valve from opening on the hot water supply system with pressure above 150psi (10.3 bar).**

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

Specifications

A Lead Free Water Pressure Reducing Valve shall be installed on the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The water pressure reducing valve shall be constructed using Lead Free* materials. Lead Free* regulators shall comply with state codes and standards, where applicable, requiring reduced lead content. Sill cocks and outside wall hydrants may be left on full main pressure at the option of the owner. Provision shall be made to permit the bypass flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main supply. Pressure reducing valves with builtin bypass check valves and strainer will be acceptable. Approved valves shall comply with ASSE 1003. Valve shall be a Watts Series LF223 or LF223S (with strainer).

NOTICE

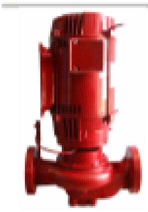
Inquire with governing authorities for local installation requirements

Recommended Booster Pump

Bell & Gossett
a xylem brand

SUBMITTAL
B-139.28B

JOB:	REPRESENTATIVE:	
UNIT TAG:	ORDER NO.	DATE:
ENGINEER:	SUBMITTED BY:	DATE:
CONTRACTOR:	APPROVED BY:	DATE:



Series e-80
5x5x9.5B
Close Coupled In-Line Centrifugal Pump

DESCRIPTION:
The Series e-80 is a highly efficient, heavy duty, close coupled pump designed for horizontal or vertical in-line mounting. The e-80 is available in stainless steel fitted construction, with flows up to 2500 GPM, heads to 380 feet.

SPECIFICATIONS

FLOW ________ HEAD ________
HP ________ RPM ________
VOLTS ________
CYCLE ________ INPUT PHASE ________
ENCLOSURE ________
APPROX. WEIGHT ________
SPECIALS ________

MATERIALS OF CONSTRUCTION
☒ Stainless Steel Fitted

MAXIMUM WORKING PRESSURE
☐ 175 psi (12 bar) with 125# ANSI flange drilling
☐ 250 psi (17 bar) with 250# ANSI flange drilling (requires 80-S)
☐ 300 psi (21 bar) W.P. with 250# ANSI flange drilling (Requires -S and EPR-Silicon Carbide-Silicon Carbide Seal)

MOUNTING
☐ In-Line Piping ☐ Flange Supports

PUMP VARIABLE SPEED CONTROL
☐ Integrated Technologic® Sensorless Control (ITSC)
☐ Integrated Technologic® (IT)
☐ External input by others
☐ Pressure Sensor(s)
☐ Differential Pressure Sensor(s)
☐ Flow Sensor(s)
☐ By Others

TYPE OF SEAL
☐ -F Standard Seal w/ Flush Line (Buna-Carbon/Ceramic)
☐ -S Stuffing Box construction w/ Flushed Mechanical Single Seal (EPR-Tungsten Carbide/Carbon)
☐ -PF Stuffing Box Construction w/ Flushed Packing (Graphite Impregnated PTFE)