UTILITY SOLUTIONS GROUP

Model 441-57S Regulator

Installation & Maintenance Manual

USG-IMM-026

Contents

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Introduction

The 441-57S medium pressure regulator is a spring-operated model that incorporate a "roll-out" diaphragm, similar to the performance found in pilot-operated regulators.

The action of the roll-out diaphragm reduces "droop," which is the fall off in outlet pressure as a spring regulator opens to increase flow. This makes the regulators' exceptional performance possible. By offering near-pilot operated regulator performance without a pilot, the 57S series offers simplicity, dependability, and exceptionally fast response.

The 441-57S is perfect for most large-capacity applications including gas distribution systems, district regulator sets, city gate stations, town border stations, monitoring, and a wide variety of industrial applications.

Installation

(See Model 441-57S Section Views on Pages 8, 9, and 11)

1. Thoroughly purge inlet piping to remove dirt and debris that could damage the regulator or impair its operation. If this cannot be done, a filter or strainer should be installed ahead of the regulator. Ensure the inside of both regulator and piping are free of dirt, foreign matter, and other debris.
2. Remove all screens and covers from the regulator and install it ensuring flow through the regulator is in the correct direction. High-pressure connects to the inlet side of the regulator.

NOTE: High-pressure connects to the inlet side of the regulator. On flanges, tighten bolts evenly. On threaded connections, apply pipe dope to male threads only. Where required, the regulator may be inverted.

3. Install vent tube on vent cap (**7**).

NOTE: The vent tubing must be ¼-inch or larger and routed to a safe location. The outlet of the vent piping must allow for the free and unobstructed passage of air and gas and must be protected against the potentials listed in the instructions.

CAUTION

It is the user's responsibility to ensure that all regulator vents and/or vent lines exhaust to a non-hazardous location away from ANY POTENTIAL sources of ignition. Where vent lines are used, it is the user's responsibility to ensure that each regulator is individually vented and that common vent lines ARE NOT used.

CAUTION

The vent must be positioned to protect against flooding, drain water, ice formation, traffic, tampering, etc. The vent must be protected against nest-building material, bees, insects, or other debris. This minimizes the chances for foreign material collecting in the vent side of the regulator diaphragm.

NOTE: For outdoor installations, it is recommended that the regulator be installed so that the regulator vent faces downward to avoid the potential for water or other foreign matter entering the regulator and interfering with proper operation. Regulators installed indoors or in a non-vented area must be vented to the outside. Route vent tubing from the vent connection to a non-hazardous location on the outside.

4. Install the control line on the ½-inch National Pipe Thread (NPT) connection (**60**), to the control connection in the outlet piping.

NOTE: Control line connection must be at the top or side of the outlet piping, NOT on the bottom. The control line should be no less than ½-inch in size, and be connected at least eight pipe diameters downstream of the regulator. It should be sturdy with adequate protection against breakage (regulators go wide-open if the control line is broken). Pitch it to drain away from the regulator, free of moisture pockets. Where outlet piping increases in size near the regulator, it is recommended to connect to the larger pipe size. The regulator will deliver the set-point pressure it is adjusted for where the control connection line is located, (see "Set-Point Adjustment" section on Page 5).

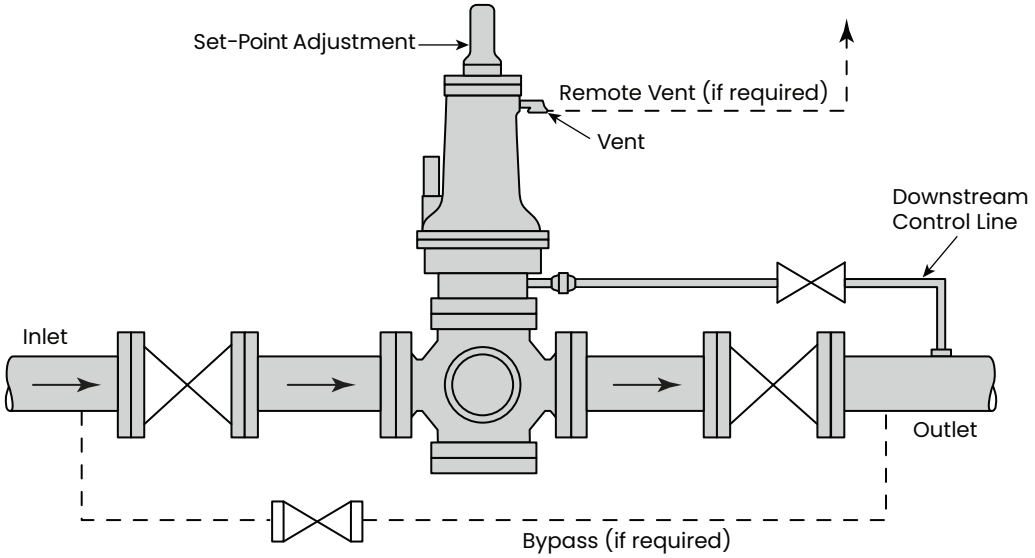
CAUTION

Interior of both the control line and its connections should be clean and smooth to minimize turbulence. Remove any rough edges, welding debris, etc. Keep pipe dope and all other foreign substances out of the control line. Never install any type of automatic shut-off device, that closes completely, between the regulator outlet and the control line.

NOTE: The ½-inch NPT connection (**60**) contains a small orifice, approximately 1/16-inch diameter. This orifice should not be removed. Ensure it is open and free of foreign material.

5. Start-up the regulator to allow the flow of gas, (see "Start-Up" section on Page 4).
6. Check all connections for leaks.

Typical Installation



Start-Up

(See Typical Installation illustration above)

To make the regulator operational, slowly open valves in this order:

1. Slowly open downstream control line valve (**A**).
2. Slowly open downstream block valve (**B**).
3. Very slowly open upstream block valve (**C**).

CAUTION

Turn gas on very slowly. If an outlet stop valve is used, it should be opened first. Do not overload diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload.

Shutdown

(See Typical Installation illustration above)

To shut down, carefully close valves in this order:

1. Close downstream control line valve (**C**).
2. Close downstream block valve (**B**).
3. Close upstream block valve (**A**).
4. Ensure that pressure has been safely relieved from the valve prior to proceeding with any further actions.

Warning

The regulator must be entirely depressurized before removal, replacement, or servicing. Failure to relieve all pressure risks damaging the regulator, downstream piping, or result severe personal injury.

Servicing

(See Model 441-57S Section Views on Pages 8, 9, and 11)

General Notes

1. Shutdown regulator, (see "Shutdown" section).
2. A quick visual inspection of the valve can be made by removing inspection plates (**38**) from the sides of the body. These provide greatly improved access to the valve when servicing or adjusting.
3. Carefully note location and position of disassembled parts to ensure correct reassembly. Inspect each one carefully and replace those that are worn, damaged, or otherwise unsatisfactory.

NOTE: The diaphragm (**20**), the springs (**14**), and all other parts from the diaphragm up, except the diaphragm connecting stem (**24**), are fully interchangeable with the Model 461-57S regulator. Valve and body parts are interchangeable with other 441 regulators (441-S, 441-X57, 441-VPC).

4. Lubricate the diaphragm connecting stem (**24**), guide (**50h**) and O-ring (**23**) with dry silicone lubricant to help ensure free movement and a tight seal.

NOTE: Only use moly or silicone based lubricants. Avoid the use of petroleum based lubricants. An application of silicone base lubricant to the other O-rings and the Tetraseals in the regulator will also help ensure their seal. Use lubricants sparingly and with care to avoid exposing tacky surfaces to the gas stream. Such surfaces could cause dirt accumulation on close clearance parts.

5. Firmly tighten all connections except the following:
   - The connection between parts (**50e**) and (**24**) on 2-inch and 3-inch regulators.
   - The connection between parts (**50i**) and (**24**) on 4-inch and 6-inch regulators.

   These connections should be turned together until they bottom out, then be backed off one-half to one-full turn.

Set-Point Adjustment

(See Model 441-57S Section Views on Pages 8, 9, and 11)

To adjust set-point for the required outlet pressure:

1. Remove seal cap (**1**) and loosen locknut (**11**).
2. Turn set-point adjusting screw (**10**) clockwise to increase the pressure and counterclockwise to decrease it.

NOTE: Only adjust set-point when gas is flowing through the regulator.

3. After adjustment is complete, locknut (**11**) should be tightened firmly and seal cap (**1**) replaced.

Replace and Adjust Valve

(See Model 441-57S Section Views on Pages 8, 9, and 11)

1. Assemble upper valve assembly parts (**50a**), (**50b**), (**50c**), (**50d**), (**50e**), (**50f**), (**50g**), and (**50i**). Assemble lower valve assembly parts (**50a**), (**50b**), (**50c**), (**50d**), (**50h**). Firmly tighten nut (**50a**). Tighten (50i) firmly against (50a).
2. Insert upper valve assembly and screw into place. Screw (**50e**) or (**50i**) into (**24**) until it bottoms.

NOTE: Once (**50e**) bottoms against (**50i**), back off (**50e**) one-half to one-full turn.

3. Reinstall orifice (**29**) if it was removed.
4. Insert lower valve assembly and screw into place by a few turns, (**50h**) screws into (**50e**).
5. Turn upper valve assembly so Allen screw (**50g**) is accessible through side inspection opening.
6. Adjust valve lock-up as follows;
   a. Hold upper valve against seat. This can be done by hand, reaching through the side inspection opening.
   b. While holding the upper valve against its seat, screw lower valve assembly upwards until the lower valve also touches its seat. When both upper and lower valves are touching their seats, they are correctly adjusted for tight lock-up.
   c. Firmly tighten Allen screw (**50g**). This locks the adjustment by evenly locking (**50h**) and (**50e**) together.

NOTE: If the entire valve assembly was removed intact and Allen screw (**50g**) has not been loosened, the assembly may be reinstalled without making the lock-up adjustment.

7. Reinstall valve assembly by turning it clockwise into the opening of the upper valve assembly.

NOTE: The threaded connection between (**24**) and (**50e**) or (**50i**) should be screwed together until it bottoms out. Then back off threaded connection one-half to one-full turn.

8. Replace side inspection plate (**38**) and its Tetraseal (**39**).
9. Replace bottom plate (**33**). Match bottom end of (**50h**) into (**31**) and/or (**32**), then turn bottom plate either direction until the first matching bolt hole position.

Remove Valve

(See Model 441-57S Section Views on Pages 8, 9, and 11)

NOTE: When changing to different size valve in 4" and 6" regulators, ensure to use the correct travel stop, (see Model 441-57S Condensed Parts Lists on Pages 8 through 11). For identification, the last digit of part number is recessed into one end of travel stop.

1. Remove seal cap (**1**), and back off adjusting screw (**10**). Remove housing cover (**5**) and spring (**14**), (**14a**) and (**14b**) if used).
2. Remove bottom plate (**33**) and side plates (**38**).
3. Insert an Allen wrench through side inspection opening and loosen Allen screw (**50g**).
4. Unscrew lower valve assembly and remove through bottom opening, (**50h**) unscrews from (**50e**).
5. Unscrew upper valve assembly and remove through side opening, (**50e**) or (**50i**) unscrews from (**24**).

NOTE: If upper valve assembly is too large to remove through side opening, then remove it through bottom opening by also removing outlet orifice (**29**). Remove cap screws (**26**) to remove orifice, (if overly tight, jack out using cap screws in jacking holes).

Entire valve assembly may be removed intact through bottom opening by also removing orifice (**29**). This method leaves the lock-up adjustment undisturbed.

Servicing Diaphragm

1. Remove seal cap (**1**), back off adjusting screw (**10**), remove housing cover (**5**), and remove spring (**14**). If used, also remove spring (**14a**) and (**14b**).
2. Remove bolts (**42**). Then carefully remove upper diaphragm case (**8**).
3. Turn diaphragm assembly counterclockwise until (**24**) unscrews from (**50e**) or (**50i**) and remove.
4. With the diaphragm assembly removed, inspect diaphragm (**20**). If the diaphragm is worn or damaged, remove nut (**16**) to separate assembly.
5. During reassembly, ensure the fabric side of diaphragm (**20**) is faced toward the vent side of the regulator. The gasket is always placed on the spring side of the diaphragm.
6. Screw diaphragm assembly back into place.

NOTE: The threaded connection between (**24**) and (**50e**) or (**50i**) should be screwed together until it bottoms out. Then back off threaded connection one-half to one-full turn.

7. Fold roll into roll-out diaphragm and then carefully reinstall upper diaphragm case (**8**).

NOTE: Diaphragm must not be pinched between upper case (**8**) and lower case (**40**) or (**40a**). Roll-out loop must be uniformly installed, as shown in Model 441-57S Section Views on Pages 8, 9, and 11.

8. Tighten bolts (**42**) gradually by alternating between each bolt in a star pattern.
9. Replace spring, etc., per steps 6 through 9 under "Assemble 441-57S".

Servicing Orifices

NOTE: To remove outlet orifice (**29**), refer to steps 1 through 5 of "Remove Valve" section on Page 5. When replacing orifices, tighten cap screws (**26**) evenly and carefully to avoid stripping female threads in body casting.

Remove inlet orifice (**28**) as follows:

1. Remove seal cap (**1**), back off adjusting screw (**10**), then housing cover (**5**), and spring (**14**).
2. Remove bottom plate (**33**) and then unscrew valve assembly by grasping and turning (**50h**).

NOTE: (**50e**) or (**50i**) unscrews from (**24**).

3. Remove diaphragm case assembly by first opening union (**60**) and removing cap screws (**34**).
4. Remove cap screws (**26**) and inlet orifice (**28**).

NOTE: If orifice is too tight, insert jack out cap screws into jacking holes. Alternate turning screws to remove orifice as evenly as possible. Use care with O-ring (**27**).

5. Reassembly is the reverse order of disassembly.

NOTE: When replacing diaphragm assembly, the threaded connection between (**24**) and (**50e**) or (**50i**) should be screwed together until it bottoms out. Then back off threaded connection one-half to one-full turn.

Changing Spring

1. Remove seal cap (**1**), back off adjusting screw (**10**).
2. Remove housing cover (**5**), and spring (**14**).
3. Insert the new spring. Ensure it nests correctly into part (**19**) and travel indicator bracket (**45k**) is in place.

NOTE: Visually inspect diaphragm (**20**) before inserting the spring to ensure the roll-out is uniform and in place. A flashlight may be helpful in some situations.

4. Complete steps 7 through 9 of "Assemble 441-57S" section.

Spring Ranges

Outlet Pressure Min. to Max.	Spring Color	Nominal Diaphragm Size (I.D.)
3 to 6 psi	Yellow	5" All Ranges
5 to 9 psi	Gray	
7.5 to 15 psi	Blue	
12.5 to 30 psi	Red	
25 to 55 psi	Brown	
50 to 75 psi	Black	
70 to 100 psi	Black plus White	

* White spring is nested inside brown.

Assembling 441-57S

1. Install orifice (**28**) through top opening.
2. Install valve assembly and orifice (**29**) per steps 1 through 6 under "Replace and Adjust Valve" section on Page 5, (except that (**50e**) or (**50i**) does not yet screw into (**24**)).
3. Install centerpiece and lower diaphragm case (**36**) and (**40**) or (**40a**).
4. Install diaphragm assembly and case per steps 5 through 7 under "Service Diaphragm" on Page 5.
5. Replace bottom plate (**33**). Match bottom end of (**50h**) into (**31**) and/or (**32**), then rotate bottom plate either direction to the first matching bolt hole position.
6. Insert the spring ensuring it nests correctly onto upper diaphragm plate (**19**) and travel indicator bracket (**45k**) is in place.

NOTE: Visually inspect diaphragm (**20**) before inserting the spring to ensure the roll-out is uniform and in place. A flashlight may be helpful in some situations.

7. Insert top spring button (**12**). Ensure it is nested correctly on the spring and thrust bearing (**13**) is in place.
8. Install housing cover (**5**). Be sure the lower end of adjusting screw (**10**) fits into the hole in button (**12**).
9. Set adjusting screw (**10**) for desired outlet pressure. Firmly tighten jam nut (**11**) and replace seal cap (**1**).

CAUTION

Regulators are pressure control devices with numerous moving parts subject to wear that is independent upon particular operating conditions. To ensure continuous satisfactory operation, a periodic inspection schedule must be adhered with the frequency of inspection determined by the severity of service and applicable laws and regulations.

Model 441-57S Condensed Parts Lists

2", 3", 4", and 6" Models

Illustration Number	Description	Part Number
1a	Tetraseal (or O-ring), 1 ¾" × 2"	904092
4	Hex Cap Screw, 5/16"-18 × 1", 12,000 Tensile (8 used)	910030
6	Housing Cover Gasket	091-00-066-30
7	Vent Cap, ¼" NPT	137-02-505-02
10	Spring Adjustment Screw	090-16-007-02
11	Hex Steel Lock Nut, ⅝"-11	921407
13	Thrust Bearing, 3/8" Dia., Stainless Steel Ball	930510
14	Spring, Yellow 3 to 6 psi	091-00-021-05
	Spring, Gray 5 to 9 psi	091-00-021-04
	Spring, Blue 7 ½ to 15 psi	091-00-021-03
	Spring, Red 12 ½ to 30 psi	091-00-021-02
	Spring, Brown 25 to 55 psi	091-00-021-01
	Spring, Black 50 to 75 psi	091-00-021-00
	Springs, Brown plus White 70 to 100 psi:	
	Brown Outer Spring	091-00-021-01
	White Inner Spring	091-00-021-08
16	Hex Steel Nut ⅝"	905993
17	Split Lockwasher ⅝"	932531
19	Diaphragm Plate, Upper	091-00-010-00
20	Diaphragm, 5" Roll-Out	091-00-350-00
41	Steel Hex Nut, ⅜"-16 (8 used)	920853
42	Steel Hex Bolt, ⅜"-16 × 1 ¾" (8 used)	910058
45	Travel Indicator Assembly, ⅝" Scale (1 ½", 1 ¾", and 2 ⅛" Valves)	091-00-365-75
	1" Scale (3" Valves)	091-00-365-77
	1 ¼" Scale (4 ¼" Valves)	091-00-365-79
60	½" NPT Nipple, Orifice Plug and Steel Union	090-16-361-01
90	Nameplate	090-00-086-05
91	Nameplate, Round	090-16-086-00
92	Round Head Type-U Drive Screw, #4 × 3/16"	903004
93	Round Head Machine Screw, #6-32 × ¼"	914402

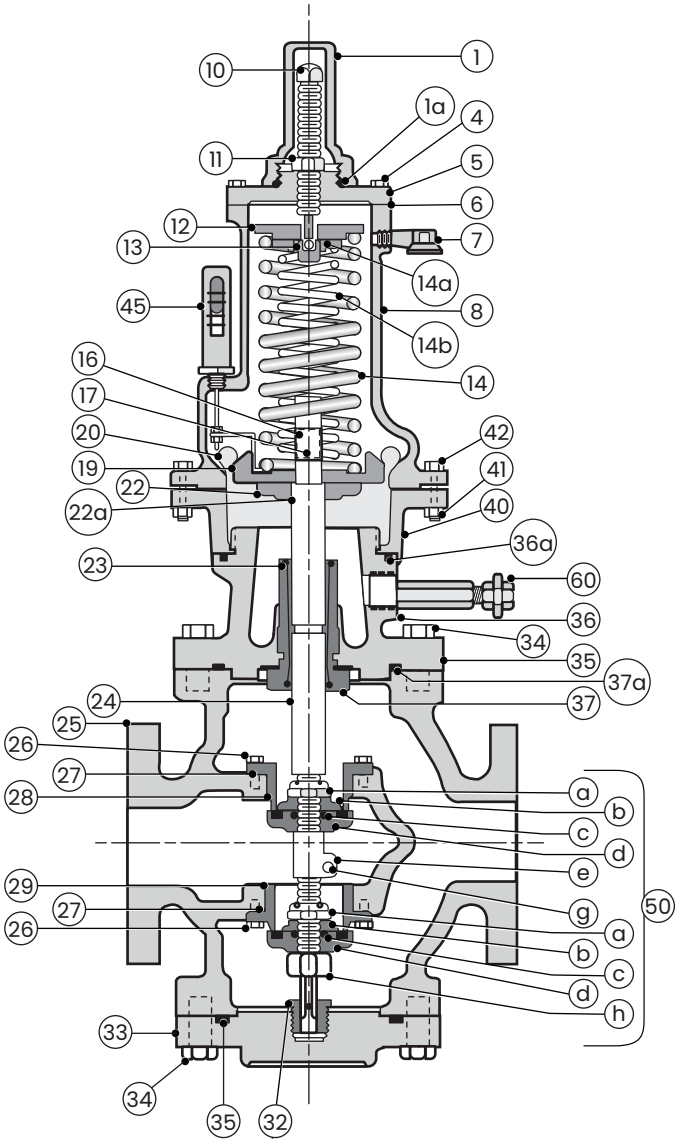
2" and 3" Models

Illustration Number	Description	Part Number
22	Lower Diaphragm Plate	091-00-022-00
22a	O-ring, ⅝" × ¾"	902922
23	O-ring, 11/16" × ⅞"	934013
24	Diaphragm Connecting Screw, Stainless Steel	090-16-058-00
32	Guide Bushing with Pin, Stainless Steel	090-16-385-03
34	Hex Cap Screw, 1/2"-13 × 1 ¼"	910106
35	Tetraseal (or O-Ring), 4 ⅜" × 4 ⅜"	904085
36	Tetraseal (or O-Ring), 3" × 3 ¼"	904084
37	Centerpiece Stem Bushing	090-16-373-00
37a	Aluminum Seal Ring	090-26-178-00
39	Tetraseal (or O-Ring), 3 ¼" × 3 ½"	904078

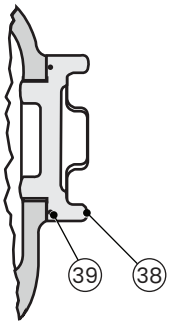
2" and 3" Models
(Continued)

Illustration Number	Description	Part Number
50	Valve Assembly, 1 ¾", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-16-515-52
	Valve Assembly, 1 ½", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-16-515-53
50a	Valve Lock Nut, ⅝"-18	090-16-034-00
50b	Valve Retainer, Standard, Stainless Steel, 1 ¾"	090-16-018-30
	Valve Retainer, V-port Wings, Stainless Steel, 1 ¾"	090-16-012-53
	Valve Retainer, Standard, Stainless Steel, 1 ½"	090-16-012-52
	Valve Retainer, V-port Wings, Stainless Steel, 1 ½"	090-16-012-55
50c	O-ring, ⅝" × 13/16"	934012
50d	Molded Valve, 1 ¾", Buna-N (Black, 50-55 Duro) All Trim	090-16-315-00
	Molded Valve, 1 ½", Buna-N (Black, 50-55 Duro) All Trim	090-16-315-01
	Molded Valve, 1 ¾", Pulyurethane (Red, 65-75 Duro) All Trim	090-16-315-02
	Molded Valve, 1 ½", Pulyurethane (Red, 65-75 Duro) All Trim	090-16-315-03
	Molded Valve, 1 ¾", Pulyurethane (Tan, 85-95 Duro) All Trim	090-16-315-05
	Molded Valve, 1 ½", Pulyurethane (Tan, 85-95 Duro) All Trim	090-16-315-04
50e	Female Valve Stem, Stainless Steel	090-16-116-01
50g	Adjustment Clamp Screw, Socket Head Screw 10-24 × ½"	903486
	Adjustment Clamp Screw, for 1 ½" Valve Only	090-16-046-01
50h	Male Valve Stem, Stainless Steel	090-16-016-02

2" and 3" Model 441-57S Section View



Side Inspection Plate



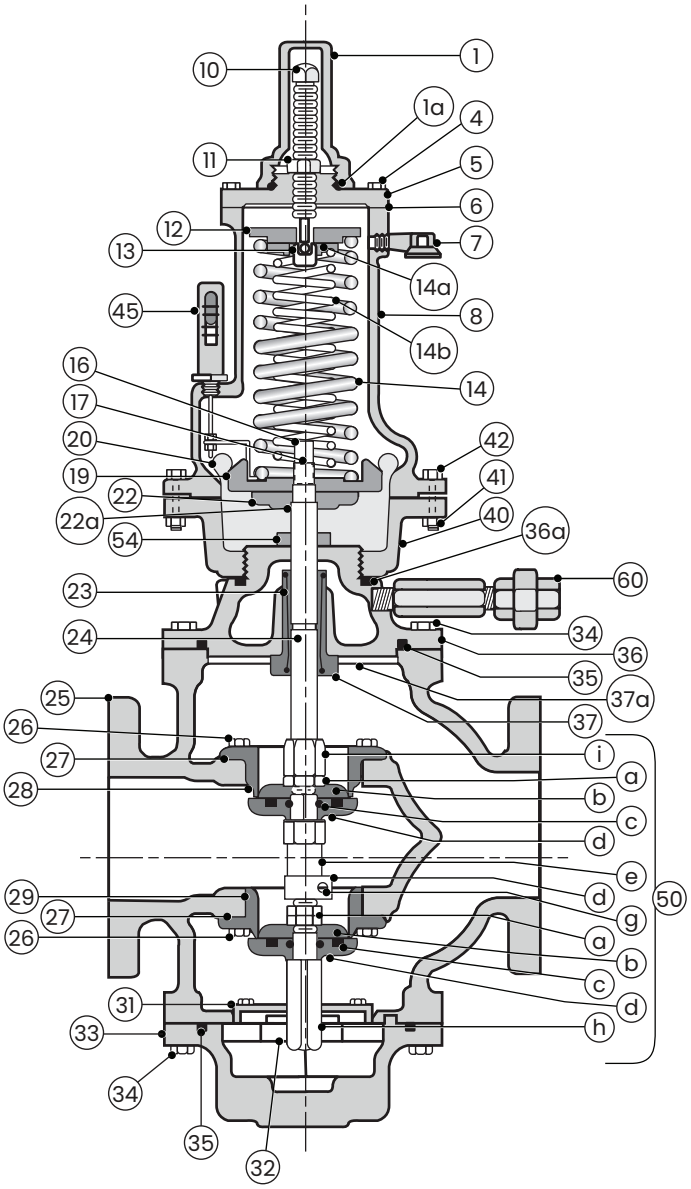
2" Models

Illustration Number	Description	Part Number
26	Hex Cap Screw, ¼"-20 × ½", 12,000 Tensile	910001
27	O-ring (for Orifices)	904832
28	1 ¾" Inlet Orifice, Stainless Steel	090-16-028-50
	1 ½" Inlet Orifice, Stainless Steel	090-16-028-51
29	1 ¾" Inlet Orifice, Stainless Steel	090-16-029-50
	1 ¾" Inlet Orifice, Stainless Steel	090-16-029-51

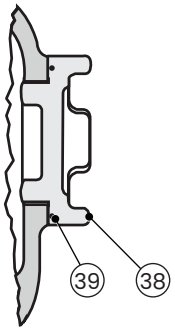
3" Models

Illustration Number	Description	Part Number
26	Hex Cap Screw, ¼"-20 × ½", 12,000 Tensile	910001
27	O-ring (for Orifices)	950818
28	2 ⅛" Inlet Orifice, Stainless Steel	090-20-028-50
	1 ¾" Inlet Orifice, Stainless Steel	090-20-028-52
	1 ½" Inlet Orifice, Stainless Steel	090-20-028-53
29	2 ⅛" Inlet Orifice, Stainless Steel	090-20-029-50
	1 ¾" Inlet Orifice, Stainless Steel	090-20-029-52
	1 ½" Inlet Orifice, Stainless Steel	090-20-029-53
50	Valve Assembly, 2 ⅛", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-20-515-60
50b	Valve Retainer, Standard, Stainless Steel, 2 ⅛"	090-20-018-30
	Valve Retainer, V-port Wings, Stainless Steel, 2 ⅛"	090-20-012-51
50d	Molded Valve, 2 ⅛", Buna-N (Black, 50-55 Duro) All Trim	090-20-315-00
	Molded Valve, 2 ⅛", Polyurethane (Red, 65-75 Duro) All Trim	090-20-315-02
	Molded Valve, 2 ⅛", Polyurethane (Tan, 85-95 Duro) All Trim	090-20-315-03

4" Model 441-57S Section View



Side Inspection Plate



4" Models

Illustration Number	Description	Part Number
22	Lower Diaphragm Plate	091-00-022-01
22a	O-ring, ⅝" × ¾"	902922
23	O-ring, 1 1/16" x ⅞"	934013
24	Diaphragm Connecting Stem, Stainless Steel	090-16-058-00
26	Hex Cap Screw, ⅜"-16 × ¾", 12,000 Tensile	910053
27	O-ring for Orifice	905583
28	3" Inlet Orifice, Stainless Steel	090-22-028-50
	2 ⅛" Inlet Orifice, Stainless Steel	090-22-028-52
	1 ¾" Inlet Orifice, Stainless Steel	090-22-028-51
29	3" Inlet Orifice, Stainless Steel	090-22-029-50
	2 ⅛" Inlet Orifice, Stainless Steel	090-22-029-52
	1 ¾" Inlet Orifice, Stainless Steel	090-22-029-51
30	Hex Cap Screw, ⅜"-16 × 1"	910055
31	Spin Stop Plate	090-22-040-01
32	Guide Bushing, Stainless Steel	090-22-074-01
34	Hex Cap Screw, ⅝"-11 × 1 ½"	910157
	Hex Cap Screw, ⅝"-11 × 1 ¾", for Ductile Bottom Plate	910158
35	Tetraseal (or O-ring), 6 ¼" × 6 ½"	904080
36a	Tetraseal (or O-ring), 4" × 4 ¼"	904084
37	Centerpiece Stem Bushing	090-16-373-00
37a	Aluminum Seal Ring	090-26-178-00
39	Tetraseal (or O-ring), 4 ¼" × 4 ½"	904083
50	Valve Assembly, 3", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-22-515-60
	Valve Assembly, 2 ⅛", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-22-515-61
	Valve Assembly, 1 ¾", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-22-515-62
50a	Valve Lock Nut, ¾"-16	090-22-034-00
50b	Valve Retainer, Standard, Stainless Steel, 3"	090-22-018-00
	Valve Retainer, V-port Wings, Stainless Steel, 3"	090-22-012-40
	Valve Retainer, Standard, Stainless Steel, 2 ⅛"	090-22-018-31
	Valve Retainer, V-port Wings, Stainless Steel, 2 ⅛"	090-22-012-51
	Valve Retainer, Standard, Stainless Steel, 1 ¾"	090-22-018-34
50c	O-ring, 1 3/16" × 1"	904173

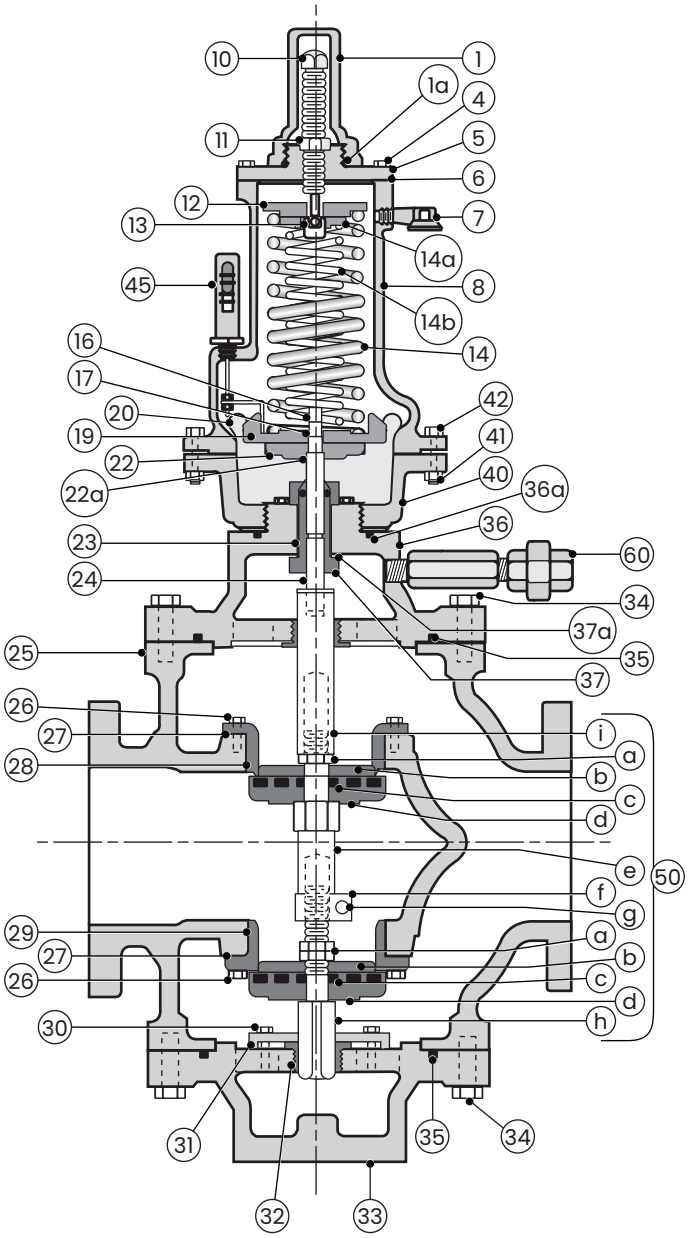
4" Model
(Continued)

Illustration Number	Description	Part Number
50d	Molded Valve, 3", Buna-N (Black, 50-55 Duro) All Trim	090-22-315-00
	Molded Valve, 2 ⅛", Buna-N (Black, 50-55 Duro) All Trim	090-22-315-01
	Molded Valve, 1 ¾", Buna-N (Black, 50-55 Duro) All Trim	090-22-315-04
	Molded Valve, 3", Polyurethane (Red, 65-75 Duro) All Trim	090-22-315-02
	Molded Valve, 2 ⅛", Polyurethane (Red, 65-75 Duro) All Trim	090-22-315-03
	Molded Valve, 1 ¾", Polyurethane (Red, 65-75 Duro) All Trim	090-22-315-05
	Molded Valve, 3", Polyurethane (Tan, 85-95 Duro) All Trim	090-22-315-08
	Molded Valve, 2 ⅛", Polyurethane (Tan, 85-95 Duro) All Trim	090-22-315-07
	Molded Valve, 1 ¾", Polyurethane (Tan, 85-95 Duro) All Trim	090-22-315-06
50e	Female Valve Stem, Stainless Steel	090-22-016-41
50f	Adjustment Clamp Ring, Stainless Steel	090-22-043-02
50g	Adjustment Clamp Screw, Socket Head Screw, ¼"–20 × ¾"	903494
50h	Male Valve Stem, Stainless Steel	090-22-116-01
50i	Stem Extension, Stainless Steel	090-22-058-40
54	Travel Stop, for 3" Valves	090-22-040-51
	Travel Stop, for 2 ⅛" and 1 ¾" Valves	090-22-040-55

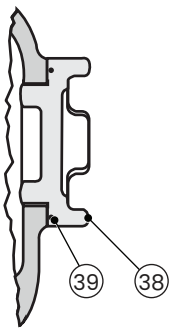
6" Model

Illustration Number	Description	Part Number
22	Lower Diaphragm Plate	091-00-022-02
22a	O-ring, ⅝" × ¾"	902922
23	O-ring, 1 1/16" x ⅞"	934013
24	Diaphragm Connecting Stem, Stainless Steel	090-22-058-00
26	Hex Cap Screw, ⅜"–16 × 1", 12,000 Tensile	910055
27	O-ring for Orifice	906301
28	4 ¼" Inlet Orifice, Stainless Steel	090-24-028-02
	3" Inlet Orifice, Stainless Steel	090-24-028-12
	2 ⅛" Inlet Orifice, Stainless Steel	090-24-028-24
29	4 ¼" Inlet Orifice, Stainless Steel	090-24-029-02
	3" Inlet Orifice, Stainless Steel	090-24-029-12
	2 ⅛" Inlet Orifice, Stainless Steel	090-24-029-24
30	Hex Cap Screw, ⅜"–16 × 1"	910055
31	Spin Stop Plate	090-24-040-01
32	Guide Bushing, Stainless Steel	090-24-074-01
34	Hex Cap Screw, ⅝"–11 × 2"	910159
35	Tetraseal (or O-ring), 7 ¾" × 8"	904088
36	Tetraseal (or O-ring), 4" × 4 ¼"	904084
37	Centerpiece Stem Bushing	090-16-373-02
37a	Aluminum Seal Ring	090-26-178-00
39	Tetraseal (or O-ring), 6" × 6 ¼"	904089
50	Valve Assembly, 4 ¼", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-24-515-60
	Valve Assembly, 3" Stainless Steel Trim Polyurethane (Red, 65-75 Duro)	090-24-515-41
	Valve Assembly, 2 ⅛", Stainless Steel Trim, Polyurethane (Red, 65-75 Duro)	090-24-515-62
50a	Valve Lock Nut	015-31-034-70
	Valve Lock Nut, ⅝"–18, for 2 ⅛" Reduced Valve Only	090-16-034-00
50b	Valve Retainer, Standard, Stainless Steel, 4 ¼"	090-24-018-00
	Valve Retainer, V-port Wings, Stainless Steel, 4 ¼"	090-24-012-40
	Valve Retainer, Standard, Stainless Steel, 3"	090-24-018-22
	Valve Retainer, V-port Wings, Stainless Steel, 2 ⅛"	090-20-012-51

6" Model 441-57S Section View



Side Inspection Plate



6" Model

(Continued)

Illustration Number	Description	Part Number
50c	O-ring, 1 3⁄16" × 1 3⁄8"	904174
	O-ring, 5⁄8" × 13⁄16", for 2-1/8" Reduced Valve Only	934012
50d	Molded Valve, 4 1⁄4", Buna-N (Black, 50-55 Duro) All Trim	090-24-315-00
	Molded Valve, 3", Buna-N (Black, 50-55 Duro) All Trim	090-24-315-01
	Molded Valve, 2 1⁄8", Buna-N (Black, 50-55 Duro) All Trim	090-20-315-00
	Molded Valve, 4 1⁄4", Polyurethane (Red, 65-75 Duro) All Trim	090-24-315-02
	Molded Valve, 3", Polyurethane (Red, 65-75 Duro) All Trim	090-24-315-03
	Molded Valve, 2 1⁄8", Polyurethane (Red, 65-75 Duro) All Trim	090-20-315-02
	Molded Valve, 4 1⁄4", Polyurethane (Tan, 85-95 Duro) All Trim	090-24-315-05
	Molded Valve, 3", Polyurethane (Tan, 85-95 Duro) All Trim	090-24-315-04
	Molded Valve, 2 1⁄8", Polyurethane (Tan, 85-95 Duro) All Trim	090-20-315-03
50e	Female Valve Stem, Stainless Steel	090-24-016-01
	Female Valve Stem, Stainless Steel, for 2 1⁄8" Reduced Valves Only	090-24-016-11
50f	Adjustment Clamp Ring, Stainless Steel	090-24-043-02
	Adjustment Clamp Ring, Stainless Steel, for 2 1⁄8" Reduced Valves Only	090-16-043-03
50g	Adjustment Clamp Screw, Socket Head Screw, 5/16"-18 × 1"	903498
	Adjustment Clamp Screw, for 2 1⁄8" Reduced Valves Only	903494
50h	Male Valve Stem, Stainless Steel	090-24-116-01
50i	Stem Extension, Stainless Steel	090-24-062-04
	Valve Stem Hex Extension, for 2 1⁄8" Reduced Valves Only	090-16-062-11
54	Travel Stop, for 4 1⁄4" Valves	090-22-040-50
	Travel Stop, for 3" Valves	090-22-040-52
	Travel Stop, for 2 1⁄8" Valves	090-22-040-56

Overpressurization Protection

Methods of overpressurization protection include relief valves, monitor regulators, shutoff devices, or similar mechanisms. These protect the downstream piping system and the regulator's low-pressure chambers against overpressurization due to possible regulator malfunction or failure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, Utility Solutions Group document USG-IG-038, and other applicable standards.

CAUTION

Turn gas on slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload.

Maximum Emergency Pressures

Before using any of the below data, ensure this entire section is clearly understood.

The following are the maximum inlet pressures which the regulator body may be subjected to under abnormal conditions without causing internal damage are:

Cast Iron Body ..... Maximum Inlet Pressure + 25 psi
Ductile Iron Body ..... Maximum Inlet Pressure + 60 psi
Cast Steel Body ..... Maximum Inlet Pressure + 100 psi

The maximum outlet pressure which the diaphragm may be subjected to under abnormal conditions without causing internal damage is:

Maximum Outlet Pressure ..... set-point + 25 psi.

NOTE: The "set-point" is the outlet pressure the regulator is adjusted to deliver.

The maximum pressure that can be safely contained by the diaphragm case is:

Maximum Pressure ..... 175 psi

NOTE: Safely contained means no leakage and no bursting.

CAUTION

If any pressure exceeds the above values the regulator must be removed from service and inspected. Damaged or otherwise unsatisfactory parts must be repaired or replaced before returning the regulator to service.

Maximum Inlet Pressures by Valve Size

Valve Size	Maximum Inlet Pressure
4 ¼"	150 psi
3"	300 psi
2 ⅛"	500 psi
1 ¾"	1,000 psi
1 ½"	1,000 psi

Maximum Differential and Inlet Pressure

(For various soft-seated valve materials)

The differential and inlet pressures given below are only to be used as general guidelines. In all cases, pressures must always remain within the ranges specified in Utility Solutions Group literature. For any given regulator, do not exceed the specified maximum pressures.

Valve Material Selection

Valve Material	Maximum Pressure Differential	Maximum Inlet Pressure
Buna-N (Black, 50 to 55 duro)	250 psi	575 psi
Polyurethane (Red, 65 to 75 duro)	400 psi	720 psi
Polyurethane (Tan, 85 to 95 duro)	600 psi	1,200 psi

NOTE: The maximum temperature for the above materials are 150°F. Viton, if used, has a maximum temperature rating of 300°F and a maximum pressure differential of 250 psi.

Capacities at Other Pressures

Capacity for pressure reductions, (see document USG-SB-011 for capacities), can be calculated with the following formula:

$Q = K\sqrt{P_o(P_i - P_o)}$ ..... (for P_i/P_o less than 1.894)

$Q = \frac{K P_i}{2}$ ..... (for P_i/P_o less than 1.894)

Q = Maximum capacity of regulator, in SCFH of 0.6 specific gravity natural gas

K = the "K" factor, the regulator constant (see table below)

P_i = absolute inlet pressure (psi)

P_o = absolute outlet pressure (psi)

Other Gases

The Model 441-57S regulator is mainly used with natural gas. However, they perform equally as well with liquid propane gas (LPG), nitrogen, dry carbon dioxide (CO_2), air and others. When using with other gases, the regulator capacities must be adjusted using the following correction factors:

Type of Gas	Correction Factor
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1,350 BTU Propane-Air Mix (Specific Gravity 1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63

For other non-corrosive gases, use the following formula:

$$\text{Correction factor} = \sqrt{\frac{0.60}{\text{Specific gravity of the gas}}}$$

For use with gases not listed above, please contact your Utility Solutions Group representative or Authorized Distributor.

Temperature Limits

The Model 441-57S Service Regulator can be used for flowing temperatures from -20°F to 150°F.

Buried Service

The Model 441-57S Service Regulators is not recommended for buried service.

Construction Materials

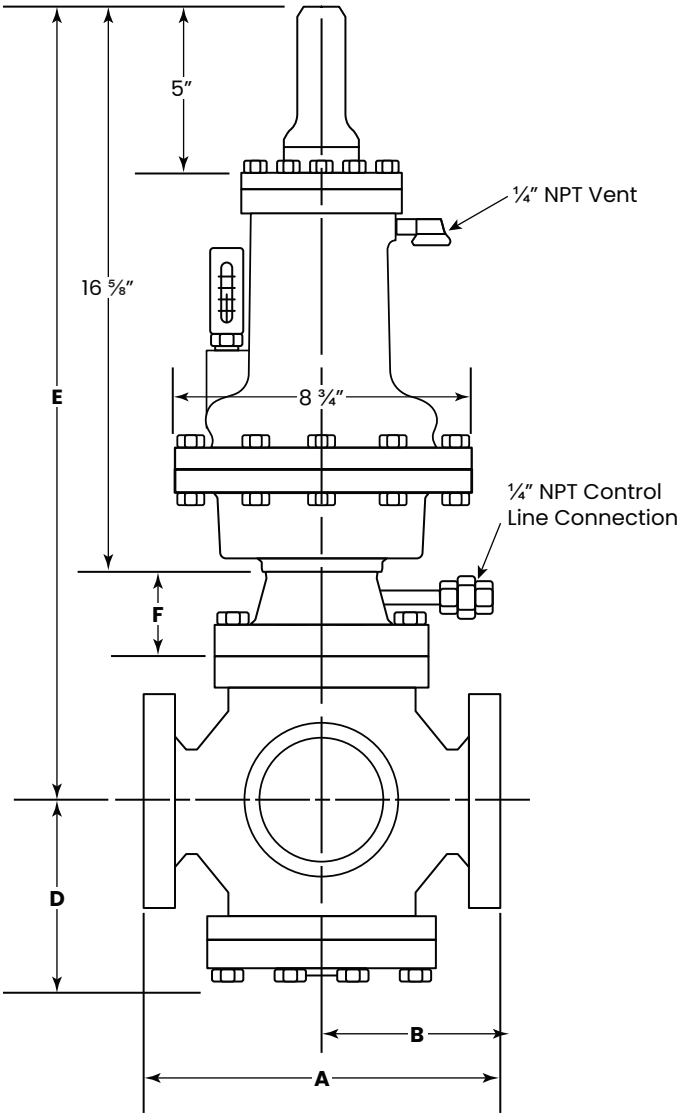
Diaphragm Housing, Spring Cage	Cast Iron (ASTM A126-71 Class B)
Housing Cover (Spring Cage Cap)	Ductile Iron (ASTM A395-71 gr 60-40-18)
Upper Diaphragm Plate	Die Cast Aluminum
Lower Diaphragm Plate	Cast Iron
Diaphragm	Buna-N with Dacron Reinforcement
Diaphragm Connecting Stem and Anti-Friction Bushing	Stainless Steel
Removable Seats (Orifices)	Cast Iron or Stainless Steel
Valve Stems	Brass or Stainless Steel
Soft Seat Valve Material	Molded Polyurethane
Holder for Valve Material	Steel
Valve Retainer	Cast Iron or Stainless Steel
Side Inspection Plates	Ductile Iron
Bodies	See "Regulator Body Construction" table below

Body Pressure Ratings

Regulator Body Type	Body Material	Maximum Working Body Pressure
2" Threaded	Cast Iron (ASTM A126-71 Class B)	250 psi
Flanged ANSI 125 lb. FF	Cast Iron (ASTM A126-71 Class B)	175 psi
Flanged ANSI 250 lb. RF	Ductile Iron (ASTM A395-71 gr 60-40-18)	575 psi
Flanged ANSI 300 lb. RF	Cast Steel (ASTM A2 16-70A GR WCB)	720 psi
Flanged ANSI 600 lb. RF*	Cast Steel (ASTM A2 16-70A GR WCB)	1,200 psi

* 2" and 3" pipe size only.

Dimensions



Regular Body Type		Pipe Size				
		Threaded 2″	Flanged ANSI			
			2″	3″	4″	6″
125 lb. Cast Iron	A	10″	10″	11 3⁄4″	13 7⁄8″	17 3⁄4″
	B	5 5⁄16″	5 5⁄16″	6 1⁄8″	7 5⁄8″	9 7⁄16″
250 lb. Ductile Iron or 300 lb. Steel	A	-	10 1⁄2″	12 1⁄2″	14 1⁄2″	18 5⁄8″
	B	-	5 9⁄16″	6 1⁄2″	7 15⁄16″	9 7⁄8″
600 lb. Steel	A	-	11 1⁄4″	13 1⁄4″	15 1⁄2″	20″
	B	-	5 15⁄16″	6 7⁄8″	8 7⁄16″	10 9⁄16″
	D	6″	6″	6″	9 1⁄2″	12″
	E	24″	24″	24″	25″	28 1⁄2″
	F	2 11⁄16″	2 11⁄16″	2 11⁄16″	2 3⁄8″	4 3⁄16″

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