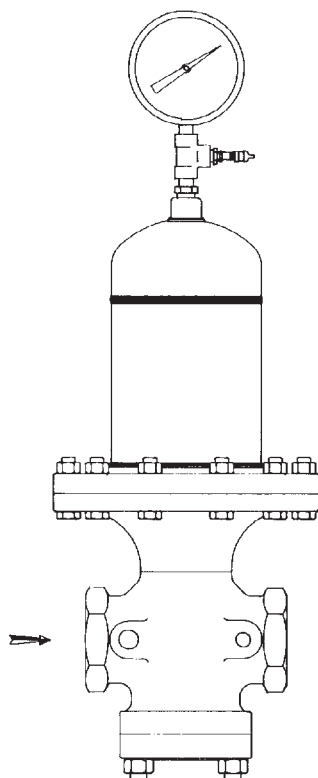




# Technical Data

A division of CIRCOR International, Inc.

**SPENCE ENGINEERING COMPANY, INC.** 150 COLDENHAM ROAD, WALDEN, NY 12586-2035



**TYPE E18 VALVE**

## TYPE E18 Main Valve CAST IRON CONSTRUCTION Sizes 3/8" through 4"

The Spence Type E18 Air loaded pressure Reducing Valve is designed to reduce a steady or varying initial pressure to a constant delivery pressure. It is particularly suited for use where poor steam conditions exist or where the pressure reducing valve station is in a remote location.

Delivery pressure adjustments are made by putting a static air load slightly higher than the delivery pressure desired into the Volume Chamber through a Schrader (tire) Valve. When the Type E18 Reducing Valve is to be located outside, exposed to the elements, it is recommended that an insulation cover be fitted over the upper air chamber. The preferred position for the Type E18 is in a horizontal line with the Volume Chamber up. Mounted in this position, foreign matter tends to fall away from the Disc and Seat Ring.

### RATINGS (Maximum Inlet Conditions)

Valve Ends \_\_\_\_\_ Pressure \_\_\_\_\_ (Temperature)

- ANSI NPT Screwed .....250 PSIG .....(450°F)
- ANSI 125 Flanged.....125 PSIG .....(450°F)
- ANSI 250 Flanged.....250 PSIG .....(450°F)

### Adjusting Range

Inlet pressure minus 15 psig, down to 10 psig.

### RATED FLOW COEFFICIENTS (Cv)

	VALVE SIZE									
	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Cv (60%)	.9	1.7	3.2	5.3	8.5	11.9	19	26	44	65

## OPERATING PRINCIPLE

Once the Volume Chamber (4) is pressurized, the Spence Type E18 becomes a normally open valve. High pressure steam flows through the Type E18 into the low pressure piping. Increasing pressure in the low pressure piping is transmitted to the underside of the valve's Diaphragm (9) through the 1/4" control

pipe. When the steam pressure in the low pressure piping approaches the pressure in the Volume Chamber (4), the Type E18 throttles to a position where just enough steam flows to maintain the set delivery pressure. Any further increase in the low pressure steam piping closes the Type E18.

## RECOMMENDED INSTALLATION

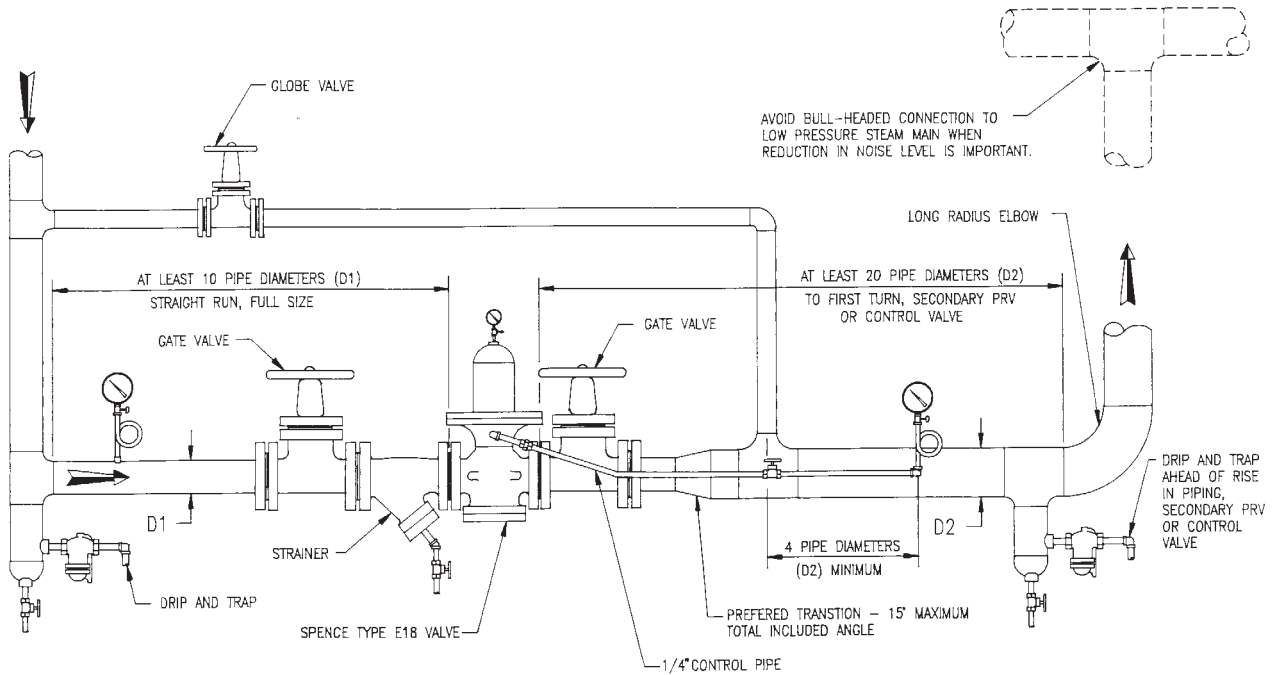


FIGURE 1

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# INSTALLATION

## PLANNING

Locate the Valve in a straight run of horizontal pipe with the Volume Chamber (4) up. (See Fig. 1) Allow clearance above and below for maintenance. When located outside, exposed to the elements, it is recommended that an insulation cover be fitted over the upper air chamber.

Prevent water hammer and erratic operation by installing traps to provide proper drainage before and after the Valve and before a secondary PRV or Control Valve. Avoid the damaging effects of scale and dirt in pipe lines by using a Strainer. (See Fig 1) Provide a 3 Valve by-pass to facilitate start-up and allow inspection and maintenance without interrupting service.

To minimize noise and erratic regulation with steam and other compressible fluids, enlarge the delivery pipe size to effect a reasonable flow velocity at the reduced pressure. A tapered concentric transition is recommended. If possible, avoid a sharp turn close to the Valve's outlet and bullheaded tee connection at the low pressure main.

Install initial and delivery pressure gages to indicate performance. If the pressure rating of the delivery system or

connected equipment is less than the initial pressure, provide a safety valve.

## MAIN VALVE

Flush the piping system thoroughly to clear it of welding beads, scale, sand, etc. Mount the Valve with the Volume Chamber up and flow arrow on the body pointing in the direction of flow. Screwed end valves should be mounted between unions.

## CONTROL PIPE

Use 1/4" pipe for the Control Pipe that connects the Base (12) below the Valve's diaphragm to the desired point of pressure control. Install the Control Pipe at a point of minimum turbulence. Avoid placing the control point immediately at the Valve outlet or after a turn. When the delivery pipe expands in size, select a point at least 4 pipe diameters beyond the point of enlargement. Pitch the Control Pipe away from the Valve to avoid erratic operation and excessive fouling. Eliminate water pockets.

Locate the Delivery Pressure Gage in the control Pipe to show pressure actually reaching the Valve's Diaphragm.

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## START-UP AND SETTING

Make sure the Valve is closed by releasing all pressure from Volume Chamber (4) through Schrader Valve (26). Use the bypass to fill the delivery system and raise pressure to slightly below normal required. Open 1/4" Control Pipe Valve then crack Outlet Gate Valve. Crack Inlet Gate Valve and blow down Strainer. **Caution: Never open a reducing valve without positive indication that the high pressure side is clear of condensate.**

Open inlet Gate Valve. Gradually pressurize the Volume Chamber with air through the Schrader Valve until the pressure

in the Volume Chamber is the same as in the delivery piping. Alternately choke down on the Bypass and open the Outlet Gate Valve until the Valve is fully on line.

Allow sufficient time for the Valve to heat up and the pressure of the air in the Volume Chamber to normalize before making final adjustment to the air pressure in the Volume Chamber to obtain the desired delivery pressure.

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## TROUBLE SHOOTING

### FAILURE TO OPEN OR SAGGING DELIVERY PRESSURE

1. Volume Chamber air load may have been tampered with.
2. Initial pressure may be down due to partially closed Inlet Gate Valve.
3. Control pipe may be plugged. Most likely points of obstruction are at shutoff valve and entrance to delivery pipe.
4. Valve Diaphragm (9) may be broken. Test with air before dismantling. **Caution: Volume Chamber (4) may be filled with steam. Do not test by hand.**

### FAILURE TO CLOSE OR OVER-RIDING DELIVERY PRESSURE

1. Volume Chamber air load may have been tampered with.
2. By-pass valve may be leaking.
4. Main valve may be held open by foreign matter in seat. Steam may wash the obstruction from the seat if the Valve is made to open wide. This can be accomplished, even at light load, if the Control Point is beyond the Outlet Gate Valve (See Fig. 1). Slowly open and close the Outlet Gate Valve.
5. Continued leakage requires dismantling of the Valve to correct.

# MAINTENANCE

## INSPECTION

Under normal conditions, complete dismantling at regular intervals is not required. A valve kept free of dirt will function for years with minimum attention.

After the first few days of operation and twice a year thereafter inspect all joints for leakage. Keep bolts tight and never allow a leak to persist.

## DISMANTLING MAIN VALVE

Connect a source of air or water pressure which can be adjusted by hand to the Schrader Valve (26). Apply at least 80 psig to the Volume Chamber (4) to open the valve and prevent the Stem (22) from turning while removing the Stem Nuts (18).

## REPLACING SEAT RINGS

These joints should be made up with Copaltite, Permatex or equal plastic gasket compound. Remove old compound from body with a wire brush. Apply new compound sparingly to shoulders (not threads) of both body and new seat ring. Let stand until tacky before assembling.

## GRINDING IN

Seats and discs should never require more than the lightest touch up with very fine (400 grit) grinding compound. Heavy grinding will produce galling, wider seating surface and a groove in the disc, all of which tend to cause leakage. Grind sparingly.

Stem (22) is slotted for rotation with a screwdriver, Valve spring (24) is omitted from the assembly during grinding. Slip the stem into its normal position. Apply compound to the disc, place it on the stem and tighten with one stem nut.

After grinding, disassemble and clean all parts.

## VALVE SETTING

Valve setting is gaged at K (Fig. 2) to establish correct stem length and diaphragm position. To install new stem (22), grind in shoulder with disc (20) and fasten firmly on stem with stem nut. Insert stem and disc assembly in valve and screw on pressure plate (10). Omit spring (24) for this operation. Hold disc (20) on seat ring (21) and adjust position of pressure plate (10) until valve setting K is reached. Push pressure plate (10) against stops in base (12). Remove disc (20) and pressure plate and stem. Drill and insert groove pin (11) to lock the joint. Grind off stem projection flush with face of pressure plate (10).

VALVE SIZE	TYPE E	
	HOOD	TOTAL
3/8	1/32	3/32
1/2	3/64	7/64
3/4	3/64	1/8
1	1/16	5/32
1-1/4	5/64	3/16
1-1/2	3/32	7/32
2	7/64	1/4
2-1/2	1/8	9/32
3	9/64	3/8
3-1/2	5/32	11/32
4	3/16	13/32

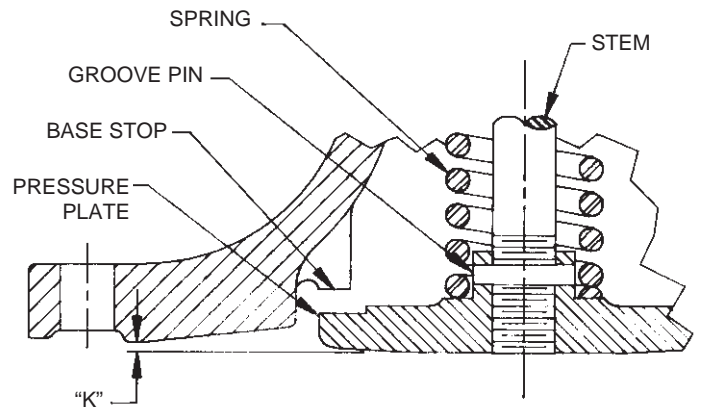
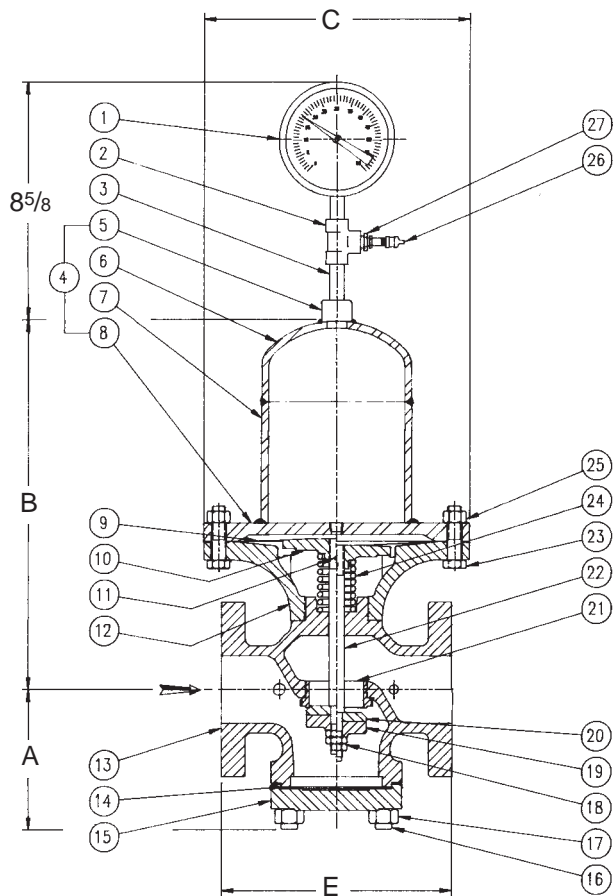


FIGURE 2



When ordering parts, it is essential that the valve type, size, service and serial number be stated.

Select part by item number, but order by part number.

Specify complete part number when ordering.

ITEM NO.	PART NAME	MATERIAL	REMARKS	VALVE SIZE				
				3/8	1/2	3/4	1	1 1/4
1	Pressure Gage	Steel		05-02452-00	05-02452-00	05-02452-00	05-02452-00	05-02452-00
2	Pipe Tee	Steel		05-05923-00	05-05923-00	05-05923-00	05-05923-00	05-05923-00
3	Nipple	Steel		05-02804-00	05-02804-00	05-02804-00	05-02804-00	05-02804-00
4	Volume Chamber Asm.	Steel		04-15616-00	04-15616-00	04-15619-00	04-15619-00	04-15624-00
5	Half Coupling	Steel		05-15612-00	05-15612-00	05-15612-00	05-15612-00	05-15612-00
6	Volume Chamber Cap	Steel		04-15614-00	04-15614-00	04-15617-00	04-15617-00	04-15622-00
7	Volume Chamber Shell	Steel		04-15615-00	04-15615-00	04-15618-00	04-15618-00	04-15623-00
8	Volume Chamber Hood	Steel		04-02570-00	04-02570-00	04-02574-00	04-02574-00	04-02578-00
9	Diaphragm (2 req.)	303SS	Note 1,2	04-01629-01	04-01629-01	04-01662-00	04-01632-00	04-01664-00
10	Pressure Plate	Cast Iron	Note 2	04-03695-00	04-03695-00	04-03579-00	04-03580-00	04-03582-00
11	Groove Pin	Steel	Note 2	05-03244-00	05-03244-00	05-03245-00	05-03245-00	05-03248-00
12	Base	Cast Iron		04-00475-00	04-00475-00	04-00467-00	04-00476-00	04-00468-00
13	Body, Screwed	Cast Iron		04-00638-00	04-00634-00	04-00639-00	04-00640-00	04-00643-00
	Body, ANSI 125	Cast Iron		—	—	—	04-00641-00	04-00644-00
	Body, ANSI 250	Cast Iron		—	—	—	04-00642-00	04-00645-00
14	Gasket	Blue-Gard	Note 1, 2	05-02361-00	05-02361-00	05-02381-00	05-02382-00	05-02382-00
15	Blind Flange ANSI 125	Cast Iron		—	—	—	—	—
	Blind Flange ANSI 250	Cast Iron		04-02213-00	04-02213-00	04-02171-00	04-02173-00	04-02176-00
16	Tap Stud ANSI 125	Steel		—	—	—	—	—
	Tap Stud ANSI 250	Steel		04-05516-00	04-05516-00	04-05516-00	04-10118-00	04-05442-00
17	Blind Flange Nuts ANSI 125	Steel		—	—	—	—	—
	Blind Flange Nuts ANSI 250	Steel		05-02847-00	05-02847-00	05-02847-00	05-02851-00	05-02854-00
18	Stem Nut (2 req.)	Steel	Note 2	05-02968-00	05-02968-00	05-02969-00	05-02970-00	05-02970-00
19	Muffling Plate	Cast Iron		—	—	—	—	—
20	Disc	420 FH	Note 2	04-01790-02	04-01800-02	04-01813-02	04-01832-02	04-01850-02
21	Seat Ring	420 FH	Note 2	04-04109-01	04-04066-01	04-04075-01	04-04084-01	04-04092-01
22	Stem	304SS	Note 2	04-05306-01	04-05306-01	04-05233-01	04-05237-02	04-05248-01
23	Diaphragm Screws	Steel		05-04771-00	05-04771-00	05-04774-00	05-04774-00	05-04774-00
24	Spring	Steel	Note 1,2	05-05000-01	05-05000-01	05-04987-01	05-04979-01	05-05010-01
25	Diaphragm Nuts	Steel		05-02872-00	05-02872-00	05-02874-00	05-02874-00	05-02874-00
26	Schrader Valve	Steel		05-06069-00	05-06069-00	05-06069-00	05-06069-00	05-06069-00
27	Reducer	Steel		05-01112-00	05-01112-00	05-01112-00	05-01112-00	05-01112-00
28	Insulation-Volume Chamber	Fiberglass		05-15639-00	05-15639-00	05-15640-00	05-15641-00	05-15642-00
	<b>REPAIR KIT</b>			—	—	—	08-11978-00	08-11979-00

Note 1 - Recommended spare part.

Note 2 - These parts furnished in Repair Kit.

**DIMENSIONS (inches) AND WEIGHTS (pounds)**

SIZE	FACE TO FACE			OTHER DIMENSIONS			APPROX. WT. (lbs.)		
	E			A	B	C	ANSI NPT	ANSI 125	ANSI 250
	ANSI NPT	ANSI 125	ANSI 250						
3/8	43/8	—	—	23/4	8	57/8	18	—	—
1/2	43/8	—	—	23/4	8	57/8	18	—	—
3/4	43/4	—	—	27/8	9	61/2	23	—	—
1	53/8	51/2	6	33/8	111/4	7	29	30	33
11/4	61/2	63/4	71/4	41/8	131/4	77/8	41	44	48
11/2	71/4	67/8	75/8	43/8	123/4	83/4	53	55	61
2	71/2	81/2	9	51/4	167/8	97/8	76	81	86
21/2	—	93/8	10	53/4	81/8	107/8	—	100	118
3	—	10	103/4	65/8	91/4	113/4	—	131	162
4	—	117/8	121/2	75/8	105/8	143/4	—	240	275

ITEM NO.	PART NAME	MATERIAL	REMARKS	VALVE SIZE				
				1 1/2	2	2 1/2	3	4
1	Pressure Gage	Steel		05-02452-00	05-02452-00	05-02452-00	05-02452-00	05-02452-00
2	Pipe Tee	Steel		05-05923-00	05-05923-00	05-05923-00	05-05923-00	05-05923-00
3	Nipple	Steel		05-02804-00	05-02804-00	05-02804-00	05-02804-00	05-02804-00
4	Volume Chamber Asm.	Steel		04-15627-00	04-15630-00	04-15632-00	04-15635-00	04-15638-00
5	Half Coupling	Steel		05-15612-00	05-15612-00	05-15612-00	05-15612-00	05-15612-00
6	Volume Chamber Cap	Steel		04-15625-00	04-15628-00	04-15628-00	04-15633-00	04-15636-00
7	Volume Chamber Shell	Steel		04-15626-00	04-15629-00	04-15631-00	04-15634-00	04-15637-00
8	Volume Chamber Hood	Steel		04-02579-00	04-02582-00	04-02646-00	04-02586-00	04-02589-00
9	Diaphragm (2 req.)	303SS	Note 1,2	04-01635-00	04-01638-00	04-01641-00	04-02038-00	04-01647-00
10	Pressure Plate	Cast Iron	Note 2	04-03581-00	04-03584-01	04-03583-00	04-03585-01	04-03587-00
11	Groove Pin	Steel	Note 2	05-03248-00	05-03248-00	05-03252-00	05-03254-00	05-03254-00
12	Base	Cast Iron		04-00472-00	04-00469-00	04-00471-00	04-00470-00	04-00473-01
13	Body, Screwed	Cast Iron		04-00646-00	04-00649-00	—	—	—
	Body, ANSI 125	Cast Iron		04-00647-00	04-00650-00	04-00653-00	04-00655-00	04-00659-01
	Body, ANSI 250	Cast Iron		04-00648-00	04-00651-00	04-00652-00	04-00654-00	04-00658-01
14	Gasket	Blue-Gard	Note 1, 2	05-02365-00	05-02366-00	05-02367-00	05-02369-00	05-02371-00
15	Blind Flange ANSI 125	Cast Iron		—	—	04-02185-00	04-02157-00	04-02158-00
	Blind Flange ANSI 250	Cast Iron		04-02178-00	04-02180-00	04-02183-00	04-02186-00	04-02159-00
16	Tap Stud ANSI 125	Steel		—	—	04-10119-00	04-05443-00	04-10119-00
	Tap Stud ANSI 250	Steel		04-05443-00	04-10119-00	04-05448-00	04-10119-00	04-05448-00
17	Blind Flange Nuts ANSI 125	Steel		—	—	05-02860-00	05-02856-00	05-02860-00
	Blind Flange Nuts ANSI 250	Steel		05-02856-00	05-02860-00	05-02862-00	05-02860-00	05-02862-00
18	Stem Nut (2 req.)	Steel	Note 2	05-02971-00	05-02971-00	05-02972-00	05-02973-00	05-02974-00
19	Muffling Plate	Cast Iron		—	04-03550-01	04-03515-00	04-03516-00	04-03518-00
20	Disc	420 FH	Note 2	04-01870-02	04-01888-02	04-01906-01	04-01918-00	04-01931-00
21	Seat Ring	420 FH	Note 2	04-04496-01	04-11544-00	04-11539-00	04-11484-00	04-11565-00
22	Stem	304SS	Note 2	04-05251-02	04-05262-01	04-05260-02	04-05279-01	04-05282-02
23	Diaphragm Screws	Steel		05-04775-00	05-04780-00	05-04779-00	05-04780-00	05-04782-00
24	Spring	Steel	Note 1,2	05-05010-01	05-04989-01	05-05021-01	05-05057-01	05-12267-00
25	Diaphragm Nuts	Steel		05-02874-00	05-02877-00	05-02877-00	05-02877-00	05-02877-00
26	Schrader Valve	Steel		05-06069-00	05-06069-00	05-06069-00	05-06069-00	05-06069-00
27	Reducer	Steel		05-01112-00	05-01112-00	05-01112-00	05-01112-00	05-01112-00
28	Insulation-Volume Chamber	Fiberglass		05-15643-00	05-15644-00	05-15645-00	05-15646-00	05-15647-00
	<b>REPAIR KIT</b>			08-11980-00	08-11981-00	—	—	—

Note 1 - Recommended spare part.

Note 2 - These parts furnished in Repair Kit.