

North American Steam Differential Pressure Regulators

Sheet 7457-1

7457 Steam Differential Pressure Regulators deliver steam at a fixed (but adjustable) differential above oil impulse pressure. They are used for steam/oil ratio control to 5642 Emulsion Atomizers.

These full-ported, pilot-operated regulators are iron with stainless steel seats and phosphor bronze diaphragms. Maximum pressure is 250 psi, maximum temperature, 450 F. 7457 Regulators maintain outlet pressure within 10% (2 psi minimum) of setting, and control flow down to 5% of table capacity.

7457 Steam Differential Pressure Regulators have integral pilots that can be set for outlet steam pressures 5-50 psi differential above the oil impulse pressure. These pilots have two diaphragms separated by a vented space. This ensures that there will not be any mixing of the two fluids loading the pilot.

Sizing. From Table 1, select a regulator with desired steam capacity for the specified inlet and outlet steam pressures. Minimum allowable pressure drop across the regulator is 10 psi. The lowest outlet pressure listed for each inlet pressure (marked ‡) is that pressure below which no further increase in capacity can be obtained.

Table 1
Capacities

10 psi min. pressure drop
flow of saturated steam, lb/hr

pressure, psi		Regulator size					
inlet	outlet	-01 (½")	-0 (¾")	-1 (1")	-2 (1¼")	-3 (1½")	-4 (2")
75	55	330	560	980	1520	2180	3420
	50	370	610	1090	1670	2370	3700
	45	400	660	1180	1800	2560	3980
	40‡	420	700	1240	1910	2750	4270
100	75	420	710	1250	1920	2750	4270
	60	520	870	1530	2370	3320	5220
	50‡	560	930	1640	2470	3610	5600
125	100	470	790	1390	2180	3040	4750
	75	640	1060	1880	2850	4080	6350
	65‡	680	1140	1990	3040	4370	6840
150	125	520	870	1530	2370	3310	5230
	100	700	1180	2070	3180	4520	7070
	80‡	800	1340	2370	3610	5130	7970
175	150	560	940	1650	2560	3610	5600
	125	770	1280	2280	3420	4940	7700
	100	900	1510	2660	4080	5800	9020
	95‡	920	1540	2750	4180	5900	9200
200	150	820	1380	2370	3700	5320	8260
	125	980	1620	2850	4370	6260	9780
	110‡	1040	1750	3040	4750	6650	10450

Installation. Install 7457 Regulators in a straight run of horizontal pipe, with a steam strainer upstream of the regulator. Install traps in the steam line upstream and downstream of the regulator. Size the steam line downstream of the regulator per Table 2. When installing the ¼" control line from the pilot to the downstream steam line, pitch it away from the pilot and avoid water pockets. The control line should enter the side or top of the pipe at least 4 pipe diameters downstream of the point where outlet piping was increased

in size. Avoid tapping the control line into elbows, tees, or other points of turbulence.

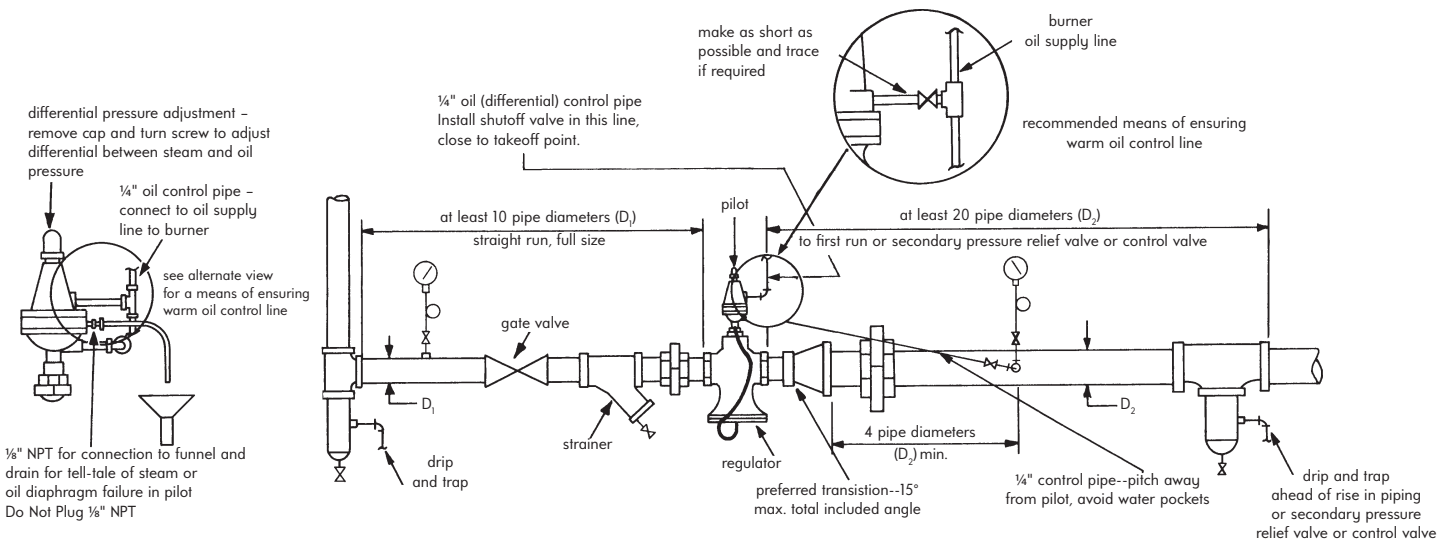
When installing 7457 Regulators, keep **heated oil** line as close as possible to the 7457 pilot, to minimize cooling of oil in the dead-ended oil impulse line.

‡ Indicates pressure below which no further increase in capacity can be obtained.

Table 2
Regulator outlet pipe sizes

flow rate of saturated steam, lb/hr	290	600	900	1700	2800	4880	9970
recommended outlet pipe size	1"	1¼"	1½"	2"	2½"	3"	4"

Pipe size recommendations are based on 2 psi pressure drop per 100 equivalent feet of pipe for 100 psi saturated steam.



Operating Principle (Ref: Dimension and Installation Dwg.s.)

1. Regulator is operated by initial steam pressure. It is normally closed, being held so by initial pressure on disc and by an internal main spring. Pilot is opened by compressing its adjusting spring.
2. When steam is turned on, it flows through pilot, to the No. 8B tee. Bleedport No. 4A restricts flow, builds pressure under the diaphragm and opens main valve. Restriction No. 5A steadies the operation of the regulator.
3. Steam delivery pressure feeds back through control pipe to the pilot diaphragm. As this pressure approaches a balance with the thrust of the adjusting spring, pilot throttles the loading pressure. In turn, main valve takes a position established by the loading pressure where just enough steam flows to maintain the set delivery/differential pressure.
4. Base bypass line is a pressure equalizing connection between diaphragm case and downstream side of main valve. It provides a means of ensuring a quick response to pressure changes, that may not be possible with normal stem clearance.

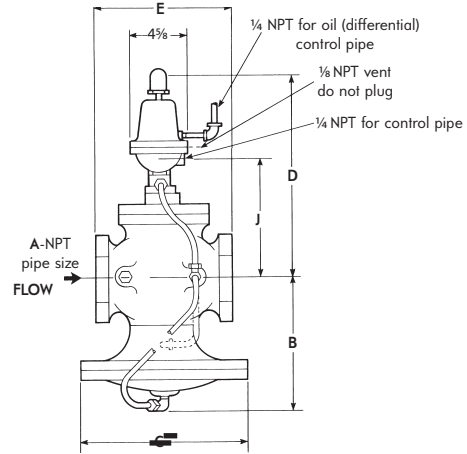
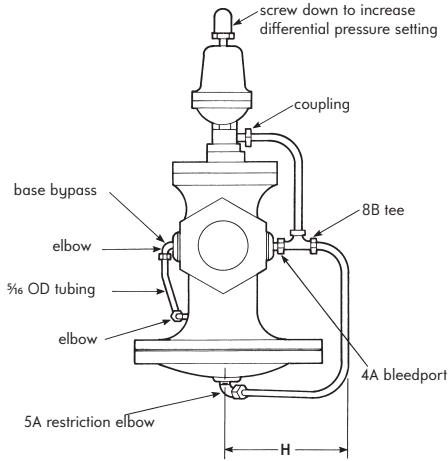
Insulation. Insulation can be applied to the upper portion (globe and flanges) of main valve. Do not insulate diaphragm chamber, or any part of pilot.

Starting up and setting.

1. Remove cap from top of pilot spring chamber. Close pilot by releasing compression on adjusting spring and by having the valve closed in the oil control line. *Caution: Do not remove adjusting screw or entirely loosen lock nut.*
2. Open valve in steam delivery control line.
3. Crack inlet stop valve. Blow down strainer. **Caution: Never open the control valve without positive indication the high side is clear of condensate.**
4. Open inlet stop valve and slowly open the valve in the oil control line.
5. Set desired steam to oil differential pressure by compressing the pilot adjusting spring. Compressing the spring increases differential.
6. Allow the trapped air in the pilot to bleed out around the threads of the adjusting screw before replacing the cap on top of the pilot spring chamber.

Maintenance and trouble-shooting. For details see instructions supplied with each regulator.

DIMENSIONS inches



Regulator designation	dimensions in inches							wt, lb
	A	B	C	D	E	H	J	
7457-01	1/2	5 1/4	5 7/8	13	4 3/8	5 1/4	6 1/2	22
7475-0	3/4	5 1/2	6 1/2	14 1/2	4 3/4	5 3/8	6 5/8	26
7457-1	1	6 1/4	7	15 1/4	5 3/8	5 1/2	7 3/8	31
7457-2	1 1/4	6 1/2	7 7/8	15	6 1/2	5 3/4	7 1/8	41
7457-3	1 1/2	7 1/8	8 3/4	15 3/8	7 1/4	6	7 1/2	51
7457-4	2	7 5/8	9 7/8	16	7 1/2	6 1/2	8 1/8	70

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American Combustion, Inc. urges compliance with National Safety Standards and Insurance Underwriters' recommendations, and care in operation.



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