

Gordon-Piatt
SPECIFICATION DATA
NATURAL GAS HANDLING EQUIPMENT

GENERAL

Proper operation of a gas fired forced draft burner is very dependent on a properly selected and assembled gas train.

Gas train requirements are dictated by such factors as:

1. Approval agency (UL, FM, IRI, etc.)
2. Gas specifications
3. Gas pressure available - flowing - @ the inlet connection
4. Burner input
5. Required burner manifold gas pressure

The data contained in this bulletin has been compiled to assist in the selection of complete gas control trains as well as individual gas controls used in conjunction with John Zink gas and gas-oil forced draft burners.

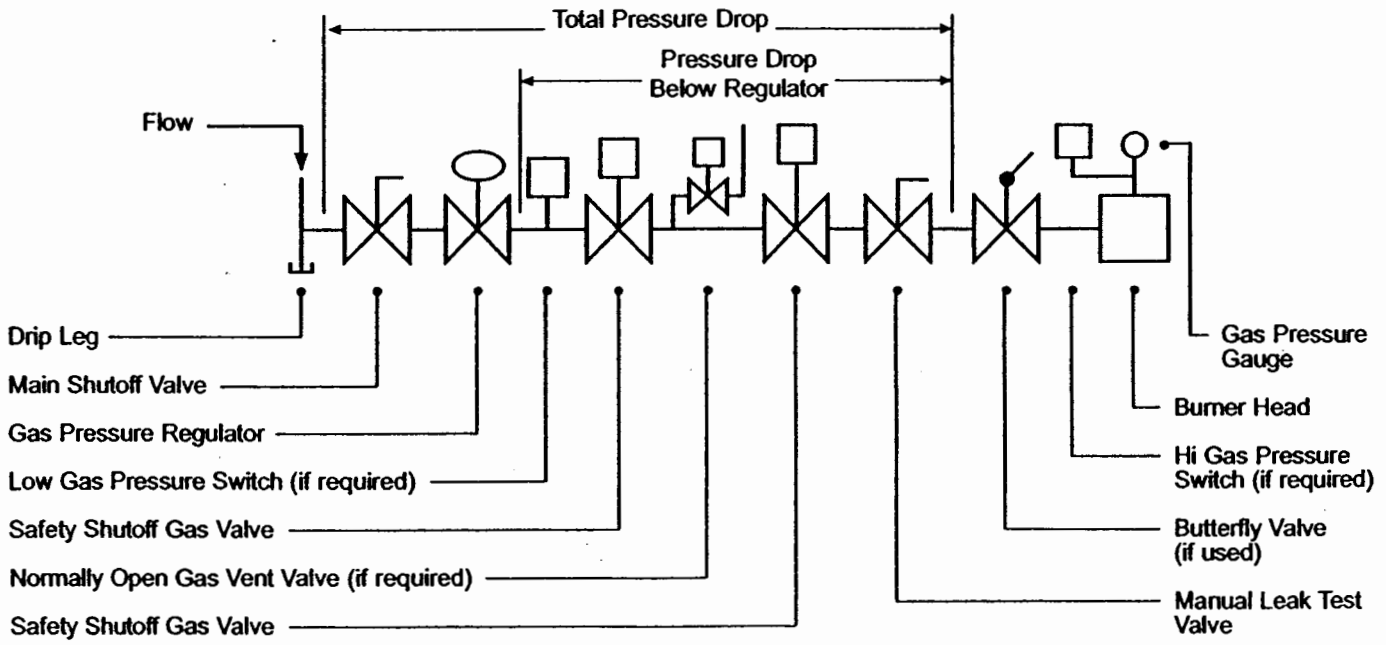
NOTE

Underwriters' Laboratories (UL) regulations require that all gas or gas-oil burners bearing the UL label must be furnished with a gas train which meets UL requirements matching the input rating of the burner.

Additional information on gas trains can be found in the following John Zink catalog sheets:

<u>Catalog Sheet Number</u>	<u>Catalog Sheet Number</u>
1-gen-10.50	1-gen-10.56
1-gen-10.54	1-gen-10.561
1-gen-10.55	1-gen-10.57
1-gen-10.551	

The schematic shown below gives the location of the various components in a typical gas train.



To avoid misunderstanding, John Zink DOES NOT furnish the piping unless a pre-piped gas train is ordered at added charge.

CAUTION

REGULATORS WITH INTERNAL CONTROL require a minimum length of five (5) pipe diameters of straight uninterrupted pipe on the outlet side for proper regulation and performance.

REGULATORS WITH AN EXTERNAL CONTROL LINE must be sized and located per regulator installation instruction bulletin.

The outlet screwed connection must be free of excess thread engagement and conform to good piping practice.

The top cap at the regulator spring must be in place or unstable operation may occur.

The control line must be sturdy with adequate protection against breakage as the regulator will go wide open if it is broken.

INDEX TO TABLES AND GRAPHS

Tables 1 through 10 list the various components that make up John Zink's standard gas trains to meet UL, FM or IRI requirements. These same tables show the combined pressure drop through these components for each size gas train including allowances for the estimated length to piping (with 3 elbows) required to connect the train to the burner manifold coupling.

It is again pointed out, that John Zink DOES NOT furnish the piping as standard unless a pre-piped gas train is ordered at an added charge.

Table	MBh Range	Gas Train Description	Page
1	400 - 2,500	UL Diaphragm Valve	4
2	400 - 2,500	UL Motorized Valve	4
3	2,501 - 5,000	UL Motorized Valve	5
4	5,001 - 12,500	UL Motorized Valve	5
5	12,501 & Up	UL Motorized Valve	6
6	400 - 5,000	IRI	6
7	5,001 & Up	IRI	7
8	400 - 5,000	FM	7
9	5,001 - 12,500	FM	8
10	12,501 & Up	FM	8
11	Equivalent Cubic Feet Per Hour for Gases with other than 0.60 Specific Gravity.		9
12	Pressure Drop through Individual Components		12, 13, 14
13	Full Lock-Up (tight shutoff) Regulators, Maximum Flow Rates		15
14	Non-tight Shutoff Regulators, Maximum Flow Rates		16

Graphs I through VI show the flow and combined pressure drop through the various standard John Zink gas control trains.

Graph	Description	Page
I	Flow thru Total Gas Train - UL Diaphragm Valve Type	9
II	Flow below Regulator - UL Diaphragm Valve Type	9
III	Flow thru Total Gas Train - UL Motorized Valve Type	10
IV	Flow below Regulator - UL Motorized Valve Type	10
V	Flow thru Total Gas Train - FM / IRI Motorized Valve Type	11
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APPLICATION NOTES

- Alternate devices may be substituted for any of the items shown at the option of John Zink.
- Pressure drops shown are based on a flow of gas with a specific gravity of 0.60 at a flow of 1,000 CFH for gas trains of sizes 1-1/2" and smaller and a flow of 10,000 CFH for gas trains of sizes 2" and larger.
- The RV53 regulator is limited to 0.5 PSI inlet pressure. The RV131 regulator is limited to 2.0 PSI inlet pressure. The remaining RV series regulators are limited to 1.0 PSI inlet pressure with inlet pressure not to exceed 10 times the desired outlet pressure.
- The following allowances for piping and ells is included in these pressure drop totals:
 - (1) Thru 1-1/2" ID - 5 ft. piping and 3 ells.
 - (2) 2" ID and above - 10 ft. piping and 3 ells.
- Gas trains shown do NOT include pressure drop required by a butterfly gas valve. Burners with "E" type gas systems will have a butterfly gas valve. Size butterfly valve supplied and pressure drops are:

Burner Size	6	7 or 8	10	12	14	16 or 18
Butterfly Valve	1-1/4"	1-1/2"	2"	2-1/2"	2-1/2"	3"
Pressure Drop	0.027"	0.019"	0.267"	0.163"	0.163"	0.064"
@ _____ CFH	1,000	1,000	10,000	10,000	10,000	10,000

- Consult factory for IRI - NFPA 8501 requirements at 12,500 MBh or higher.

PRESSURE DROP FOR STANDARD GAS TRAINS

PRESSURE DROP FOR STANDARD GAS TRAINS

TABLE 1	UL DIAPHRAGM VALVE GAS TRAIN - 400 - 2,500 MBh						
Gas train Size - IPS Gas Train Code	3/4" .07	1" .10	1-1/4"S .12S	1-1/4" .12	1-1/2" .15	1-1/2"HS .15HS	2" .20
Main Shutoff Valve	48601-04	48601-05	48601-06	48601-06	48601-07	48601-07	48601-08
Gas Pressure Regulator	RV53	RV61	RV61	RV81	RV81	RV81	RV91
2nd Safety Gas Valve	K3A	K3A	K3A	K3A	K3A	S261 (2")	S261
Safety Gas Valve	V48A	V48A	V48A	V48A	V48A	B50D (2")	B50D
Manual Leak Test Valve	48601-04	48601-05	48601-06	48601-06	48601-07	48601-08	48601-08
Pressure Drop - "w.c							
Total Gas Train	13.51	4.93	2.33	1.86	1.08	0.52	27.11
Below Regulator	11.45	4.29	1.7	1.7	0.92	0.36	20.75
Shipping Weight - Lb.	10	13	15	16	19	51	57

NOTE: Diaphragm Gas Valve Trains are limited to 2,500 MBh flow by UL Regulations.

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TABLE 2	UL MOTORIZED VALVE GAS TRAIN - 400 - 2,500 MBh							
Gas Train Size - IPS Gas Train Code	3/4" .07	1" .10	1-1/4"S .12S	1-1/4" .12	1-1/2" .15	1-1/2"HS .15HS	2" .20	2-1/2"S .25S
Main Shutoff Valve	48601-04	48601-05	48601-06	48601-06	48601-07	48601-07	48601-08	R1430
Gas Pressure Regulator	RV53	RV61	RV61	RV81	RV81	RV81	RV91	RV91
2nd Safety Gas Valve	K3A	K3A	K3A	K3A	K3A	S261 (2")	S261	S261
Safety Gas Valve	V5055	V5055	V5055	V5055	V5055	V5055 (2")	V5055	V5055
Manual Leak Test Valve	48601-04	48601-05	48601-06	48601-06	48601-07	48601-08	48601-08	R1430
Pressure Drop - "w.c								
Total Gas Train	13.55	5.05	2.58	2.11	1.24	0.54	28.97	20.64
Below Regulator	11.49	4.41	1.95	1.95	1.08	0.38	22.61	13.39
Shipping Weight - Lb.	26	29	30	31	34	57	63	103

For application notes see page 3.

PRESSURE DROP FOR STANDARD GAS TRAINS

TABLE 3		UL MOTORIZED VALVE GAS TRAIN 2,501 - 5,000 MBh							
Gas Train Size - IPS Gas Train Code	1-1/2" .15	1-1/2HS" .15HS	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H
Main Shutoff Valve	48601-07	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")
Gas Pressure Regulator	RV81	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")
2nd Safety Gas Valve	K3A	S261 (2")	S261	S261	S261	S261	S261	H117A	H117A
Safety Gas Valve	V5055	V5055 (2")	V5055	V5055	V5055	V5055	H117A	H117A	H117A
Manual Leak Test Valve	48601-07	48601-08	48601-08	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Pressure Drop - "w.c									
Total Gas Train	1.24	0.54	28.97	20.64	15.64	9.71	6.56	5.01	3.59
Below Regulator	1.08	0.38	22.61	13.39	13.39	7.68	4.53	2.98	2.98
Shipping Weight - Lb.	34	57	63	103	114	142	168	166	295

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TABLE 4		UL MOTORIZED VALVE GAS TRAIN - 5,001 - 12,500 MBh								
Gas Train Size - IPS Gas Train Code	1-1/2" .15	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H	4" .40	4"H .40H
Main Shutoff Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")	R1430	R1430
Gas Pressure Regulator	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")	RV131	RV131
2nd Safety Gas Valve	K3A	S261	S261	S261	S261	S261	H117A	H117A	V5055	H117A
Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	H117/PC	V5055/PC	H117/PC
Manual Leak Test Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Pressure Drop - "w.c										
Total Gas Train	1.24	28.97	20.64	15.64	9.71	6.56	5.01	3.59	3.26	1.5
Below Regulator	1.08	22.61	13.39	13.39	7.68	4.53	2.98	2.98	2.43	0.89
Shipping Weight - Lb.	34	63	103	114	142	168	166	295	296	446

PRESSURE DROP FOR STANDARD GAS TRAINS

For application notes see page 3.

PRESSURE DROP FOR STANDARD GAS TRAINS

TABLE 5		UL MOTORIZED VALVE GAS TRAIN - 12,501 HBh & OVER								
Gas Train Size - IPS Gas Train Code	1-1/2" .15	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H	4" .40	4"H .40H
Main Shutoff Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")	R1430	R1430
Gas Pressure Regulator	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")	RV131	RV131
2nd Safety Gas Valve	K3A	S261	S261	S261	S261	S261	S261	H117A	H117A	V5055
Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	H117/PC	H117/PC	H117/PC
Manual Leak Test Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Normally Open Vent Valve	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	2"	2"
Pressure Drop - "w.c.										
Total Gas Train	1.24	28.97	20.64	15.64	9.71	6.56	5.01	3.59	3.26	1.5
Below Regulator	1.08	22.61	13.39	13.39	7.68	4.53	2.98	2.98	2.43	0.89
Shipping Weight - Lb.	34	63	103	114	142	168	166	279	256	446

TABLE 6		IRI GAS TRAIN - 400 - 5,000 HBh										
Gas Train Size - IPS Gas Train Code	1" .10	1-1/4"S .12S	1-1/4" .12	1-1/2" .15	1-1/2"HS .15HS	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H
Main Shutoff Valve	48601-05	48601-06	48601-06	48601-07	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")
Gas Pressure Regulator	RV61	RV61	RV81	RV81	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")
2nd Safety Gas Valve	V5055	V5055	V5055	V5055	V5055 (2")	V5055	V5055	V5055	V5055	V5055	V5055	H117A
Safety Gas Valve	V5055	V5055	V5055	V5055	V5055 (2")	V5055	V5055	V5055	V5055	V5055	H117A	H117A
Manual Leak Test Valve	48601-05	48601-06	48601-06	48601-07	48601-08	48601-08	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Normally Open Vent Valve	3/4"	3/4"	3/4"	3/4"	1"	1'	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"
Pressure Drop - "w.c.												
Total Gas Train	4.41	2.17	1.7	1.06	0.56	30.82	22.98	17.98	11.31	8.16	5.01	3.59
Below Regulator	3.77	1.54	1.54	0.9	0.40	24.46	15.73	15.73	9.28	6.13	2.98	2.98
Shipping Weight - Lb.	45	46	46	49	59	65	91	102	114	140	166	295

For application notes see page 3.

PRESSURE DROP FOR STANDARD GAS TRAINS

PRESSURE DROP FOR STANDARD GAS TRAINS

TABLE 7		IRI GAS TRAIN - 5,001 & OVER								
Gas Train Size - IPS Gas Train Code	1-1/2" .15	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H	4" .40	4"H .40H
Main Shutoff Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")	R1430	R1430
Gas Pressure Regulator	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")	RV131	RV131
2nd Safety Gas Valve	V5055	V5055	V5055	V5055	V5055	V5055	V5055	H117A	V5055	H117A
Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	H117/PC	V5055/PC	H117/PC
Manual Leak Test Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Normally Open Vent Valve	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	2"	2"
Pressure Drop - "w.c.										
Total Gas Train	1.06	30.82	22.98	17.98	11.31	8.16	5.01	3.59	3.26	1.5
Below Regulator	0.9	24.46	15.73	15.73	9.28	6.13	2.98	2.98	2.65	0.89
Shipping Weight - Lb.	49	65	91	102	114	140	166	295	296	446

TABLE 8		FM GAS TRAIN - 400 - 5,000 MBh										
Gas Train Size - IPS Gas Train Code	1" .10	1-1/4"S .12S	1-1/4" .12	1-1/2" .15	1-1/2"HS .15HS	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H
Main Shutoff Valve	48601-05	48601-06	48601-06	48601-07	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")
Gas Pressure Regulator	RV61	RV61	RV81	RV81	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")
2nd Safety Gas Valve	V5055	V5055	V5055	V5055	V5055 (2")	V5055	V5055	V5055	V5055	V5055	V5055	H117A
Safety Gas Valve	V5055	V5055	V5055	V5055	V5055 (2")	V5055	V5055	V5055	V5055	V5055	H117A	H117A
Manual Leak Test Valve	48601-05	48601-06	48601-06	48601-07	48601-08	48601-08	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Pressure Drop - "w.c.												
Total Gas Train	4.41	2.17	1.7	1.06	0.56	30.82	22.98	17.98	11.31	8.16	5.01	3.59
Below Regulator	3.77	1.54	1.54	0.9	0.40	24.46	15.73	15.73	9.28	6.13	2.98	2.98
Shipping Weight - Lb.	45	46	46	49	59	65	91	102	114	140	166	295

For application notes see page 3.

PRESSURE DROP FOR STANDARD GAS TRAINS

PRESSURE DROP FOR STANDARD GAS TRAINS

TABLE 9		FM GAS TRAIN - 5,001 - 12,500 MBh								
Gas Train Size - IPS Gas Train Code	1-1/2" .15	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H	4" .40	4"H .40H
Main Shutoff Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")	R1430	R1430
Gas Pressure Regulator	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")	RV131	RV131
2nd Safety Gas Valve	V5055	V5055	V5055	V5055	V5055	V5055	H117A	H117A	V5055	H117A
Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	V5055/PC	H117/PC
Manual Leak Test Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Pressure Drop - "w.c										
Total Gas Train	1.06	30.82	22.98	17.98	11.31	8.16	5.01	3.59	3.26	1.5
Below Regulator	0.9	24.46	15.73	15.73	9.28	6.13	2.98	2.98	2.65	0.89
Shipping Weight - Lb.	49	65	91	102	114	140	166	295	296	446

TABLE 10		FM GAS TRAIN - 12,501 MBh & OVER								
Gas Train Size - IPS Gas Train Code	1-1/2" .15	2" .20	2-1/2"S .25S	2-1/2" .25	3" .30	3"L .30L	3"HS .30HS	3"H .30H	4" .40	4"H .40H
Main Shutoff Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430 (4")	R1430	R1430
Gas Pressure Regulator	RV81	RV91	RV91	RV111	RV111	RV111	RV111	RV131 (4")	RV131	RV131
2nd Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	V5055/PC	H117/PC
Safety Gas Valve	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	V5055/PC	H117/PC	H117/PC	V5055/PC	H117/PC
Manual Leak Test Valve	48601-07	48601-08	R1430	R1430	R1430	R1430	R1430	R1430	R1430	R1430
Gas Pressure Switch	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP	HGP&LGP
Normally Open Vent Valve	3/4"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	2"	2"
Pressure Drop - "w.c										
Total Gas Train	1.06	30.82	22.98	17.98	11.31	8.16	5.01	3.59	3.26	1.5
Below Regulator	0.9	24.46	15.73	15.73	9.28	6.13	2.98	2.98	2.65	0.89
Shipping Weight - Lb.	49	65	91	102	114	140	166	295	296	446

PRESSURE DROP FOR STANDARD GAS TRAINS

For application notes see page 3.

CFH FLOW AND PRESSURE DROP FOR STANDARD GAS TRAINS

Below and on the next two pages are flow and pressure drop graphs which show (1) the flow and pressure drop for the complete gas train and (2) the flow and pressure drop below the regulator. "Below the Regulator" graph application is covered further on in this bulletin.

Each standard gas train covered by the graphs that follow is listed by components on pages 4 thru 8.

The specifications for NATURAL GAS used for deriving the figures shown in the graph are:

- (1) 1000 Btu/cf
- (2) 0.60 specific gravity (s.g.)

The equivalent cubic feet per hour (ECFH) for gases with other specifications can be arrived at by using the following formula:

$$\frac{\text{MBh Rate of Gas Input Required}}{\text{MBtu/cf of Gas Available}} \times \left(\frac{\text{s.g.}}{0.60} \right)^{1/2} = \text{ECFH}$$

EXAMPLE:

Job input of burner required is 2000 MBh.
Specification of the gas available is 1040 Btu / 0.64 s.g.

NOTE

1040 Btu = 1.040 MBtu

$$\frac{2000}{1.040} \times \left(\frac{0.64}{0.60} \right)^{1/2} = 1923 \times 1.033 \text{ (See Table 11)} = 1986.5$$

The ECFH for the job is 1986.5 which is the flow rate to be used to determine the pressure drop through a selected gas train.

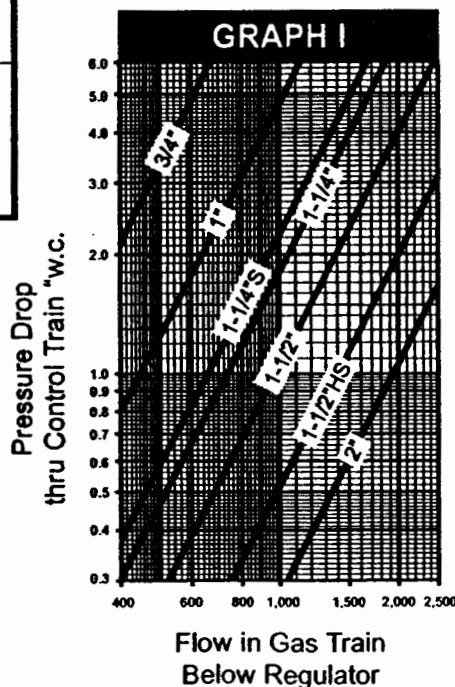
NOTE

For propane gas (2500 Btu/cf, 1.53 s.g.)
ECFH = Propane MBh x 0.639

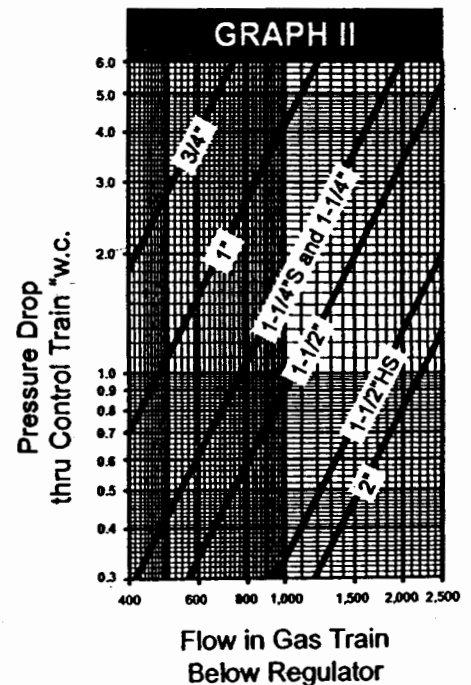
TABLE 11	
s.g. Ratios to find ECFH	
s.g.	$\left(\frac{\text{s.g.}}{0.60} \right)^{1/2}$
0.50	0.913
0.55	0.958
0.60	1.000
0.62	1.017
0.64	1.033
0.65	1.041
0.70	1.080
0.75	1.118
0.80	1.150
0.85	1.155
0.90	1.225
1.00	1.291
1.10	1.354
1.20	1.414
1.30	1.472
1.40	1.528
1.50	1.581
1.53	1.597
1.55	1.607
1.60	1.633
1.70	1.683
1.80	1.732*
1.90	1.780
2.00	1.826

CFH FLOW AND PRESSURE DROP FOR STANDARD GAS TRAINS

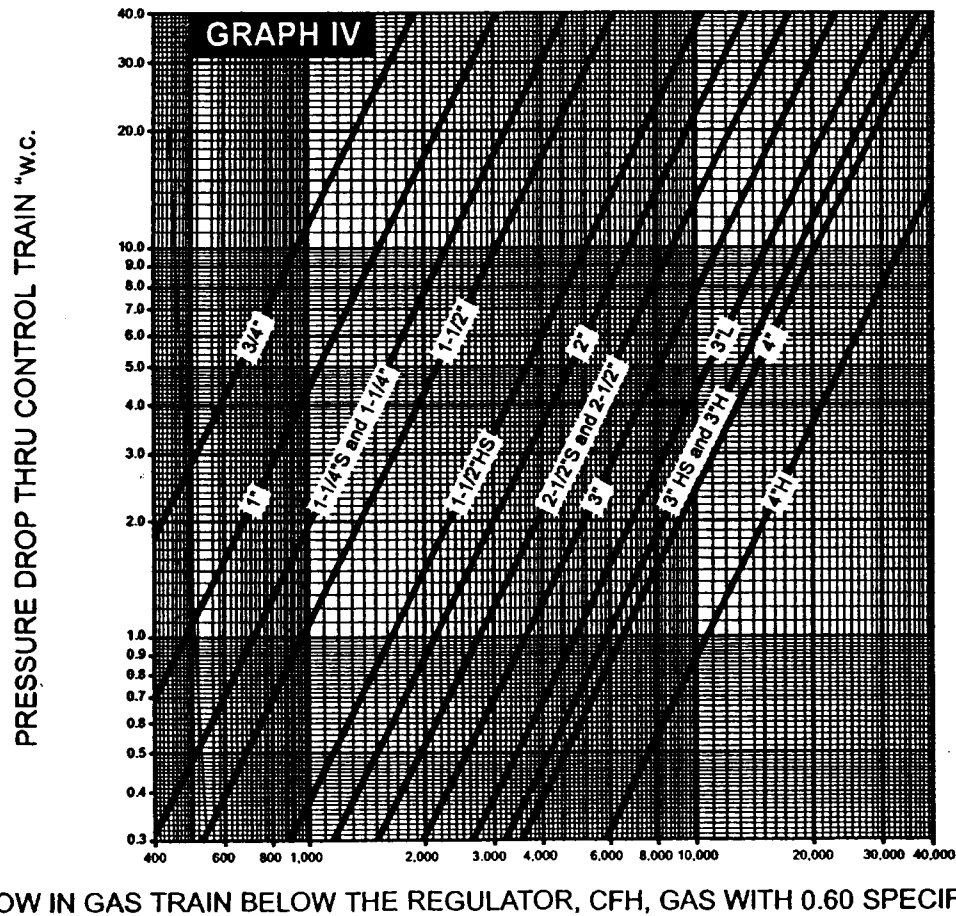
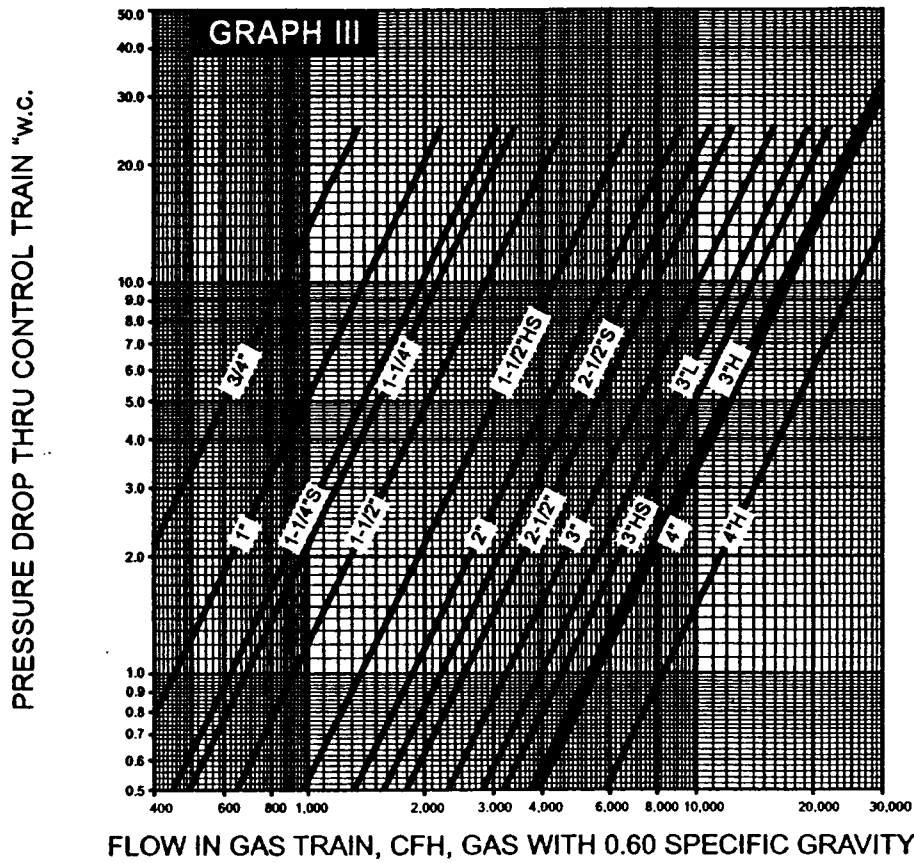
UL DIAPHRAGM VALVE GAS TRAIN See Table 1 for Components



CFH Gas with 0.60 s.g.

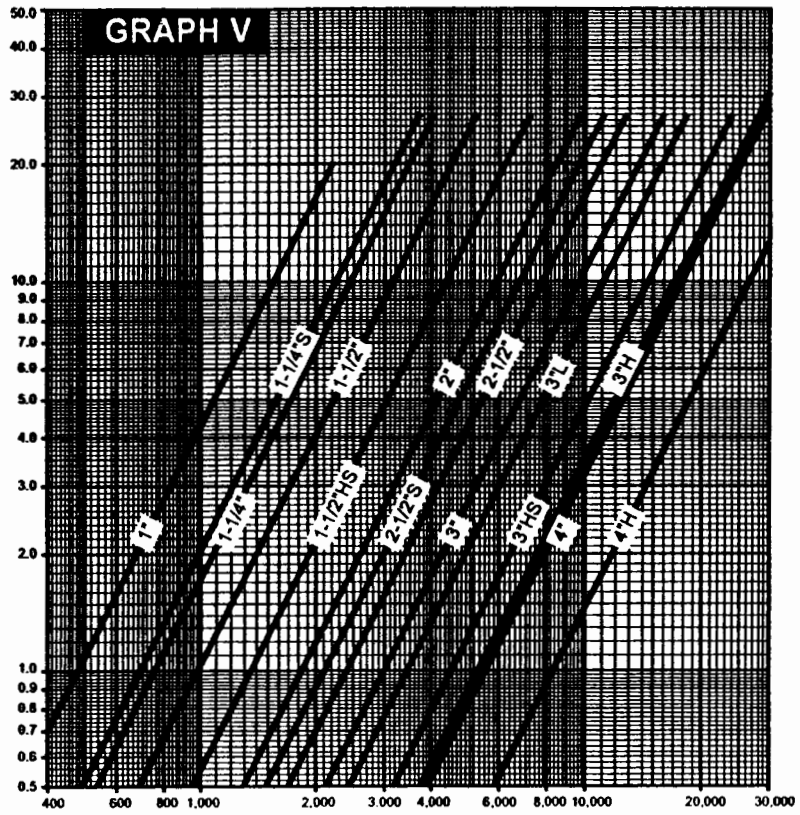


**CFH FLOW AND PRESSURE DROP FOR STANDARD GAS TRAINS
UL MOTORIZED VALVE GAS TRAINS - See Tables 2 thru 5 for Components**



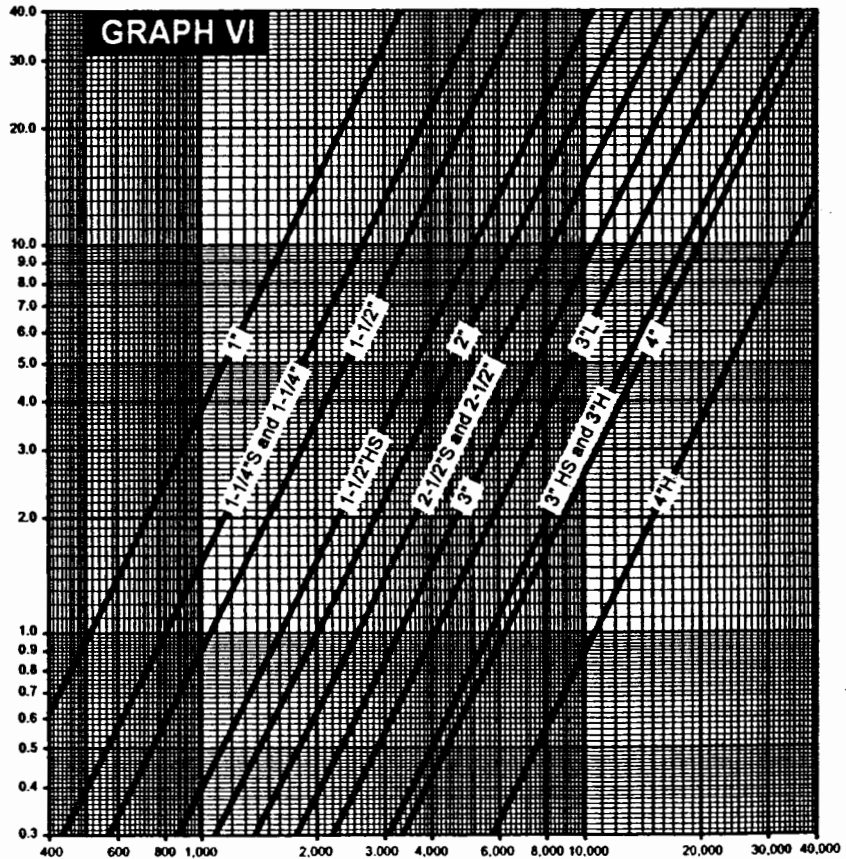
**CFH FLOW AND PRESSURE DROP FOR STANDARD GAS TRAINS
FM/IRI MOTORIZED VALVE GAS TRAINS - See Tables 6 thru 10 for Components**

PRESSURE DROP THRU CONTROL TRAIN "w.c."



FLOW IN GAS TRAIN, CFH, GAS WITH 0.60 SPECIFIC GRAVITY

PRESSURE DROP THRU CONTROL TRAIN "w.c."



FLOW IN GAS TRAIN BELOW THE REGULATOR, CFH, GAS WITH 0.60 SPECIFIC GRAVITY

PRESSURE DROP THROUGH INDIVIDUAL COMPONENTS

TABLE 12				Press. drop "w.c. @ 1,000 CFH				Pressure "w.c. @ 10,000 CFH			
				3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Diaphragm Valves	Honeywell	V48A									
		15 sec, 0.5 PSI	Pd	2.09	0.9	0.22	0.16				
		15 sec, 1.0 PSI	Pd					5.37			
		Shipping Weight	Lb	3	3	4	4	9			
	ITT -	B50D									
	General	15 sec, 1.0 PSI	Pd	2.13	0.88	0.22	0.16				
	Controls	Shipping Weight	Lb	4	4	4	4	17			
Regulators	Maxitrol -	Model		RV53	RV61	RV61	RV81	RV91	RV91	RV111	RV131*
	"Straight -	Pressure Drop	Pd	2	0.62	0.62	0.15	6.27	6.27	1.27	0.42
	Thru - Flow"	Maximum Capacity	CFH	1600	2500	2500	4500	7500	7500	17000	30000
		Max. Inlet Press.	PSI	0.5	1	1	1	1	1	1	2
		Shipping Weight	Lb	2	3	4	5	9	9	20	130
		Model - (Alternate Pipe Sizes)				RV81			RV111		
Other Regulators - Maxitrol "Straight-Thru-Flow" regulators follow the "square rule" for pressure drop within normal operating ranges. "Tight Shutoff" types do not do so. See page 15 for regulator capacity and pressure drop data.											
Manual Shutoffs	Manual Shutoffs are designated herein by John Zink designations. Manufacturers may be changed at any time, without further notice. (Size Code)			075	100	125	150	200	250	300	400
		"AS" or "Alum. Body Type"	Pd		0.25	0.12					
		Maximum Inlet Pressure	PSI		1	1					
		Shipping Weight	Lb								
		Lubricated Plug Valve									
		R1430	Pd		0.05	0.14	0.19	2.82	0.98	0.76	0.19
	Max. Inlet Pressure	PSI		75	75	75	75	200	200	200	
	Shipping Weight	Lb		4	5	6	9	15	21	40	
	UL Listed Valves	48601-XX		-04	-05	-06	-07	-08	-09	-10	
	48601-XX	Pd		0.06	0.02	0.01	0.01	0.09	0.05	0.03	
	Max. Inlet Pressure	PSI		500	500	500	500	500	400	400	
	Shipping Weight	Lb		1	2	2	3	5	6	7	
	L3S or 3-way Lube Plug Valve										
	Straight	Pd		0.38	0.189	0.63	0.37	1.67	0.58	0.25	.9*
	90 Deg. Turn	Pd		1.4	0.5	0.78	0.44	3.9	1.36	0.63	0.22
	Max. Inlet Pressure	PSI		200	200	200	200	200	200	200	200
	Shipping Weight	Lb		2	7	9	10	17	25	36	75
Flow Regulators	Eclipse	Model		4BV-A	5BV-A	6BV-A		8BV-A	10BV-A	12BV-A	16BV-A
		Butterfly Type	Pd	0.132	0.027	0.019		0.267	0.163	0.064	0.014
		Shipping Weight	Lb	2	2.5	2.75		3.75	6.5	7	12
	Maxon	Series Q-Butterfly Type	Pd	0.92	0.17	0.05		1.68	0.96	0.45	
		Max. Press. Diff.	PSI	25	25	20		10	10	5	
		Shipping Weight	Lb	19	19	22		22	31	31	

*Flanged

PRESSURE DROP THROUGH INDIVIDUAL COMPONENTS

TABLE 12 - Continued				Press. drop "w.c. @ 1,000 CFH				Pressure "w.c. @ 10,000 CFH			
				3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Automatic Valves	Honeywell	V5055A N4055A1098 - Standard VALVE, 13 sec. 5.0 PSI	Pd	2.13	1.02	0.47	0.32	7.23	5.23	3.48	0.9
		V5055B N4062A1131 - Parabolic Guide, 13 sec. 5.0 PSI or	Pd	2.13	1.02	0.47	0.32	7.23	5.23	3.48	1.12
		V5055C N4055D1019 - Proof of Closure (FM) Valve 13 sec. 5.0 PSI									
		Shipping Weight	Lb	19	19	19	19	23	26	26	43
	ITT - General Controls	(*Size Code) V710 *AS/AH2B112A4 - LStandard Valve, 15 sec. 5.0 PSI or	Pd	2.13	1.02	0.47	0.32	7.23	5.23	3.48	
		*ASV15/AH4B112A4-Parabolic Guide, 30 sec. 5.0 PSI or *ASV22/AH2B112S4 - Proof of Closure, 15, sec. 5.0 PSI									
	Shipping Weight	Lb	18	18	19	19	24	27	26		
Automatic Valves	H117A	*112 - Standard Valve or	Pd		0.24	0.13	0.06	1.47	0.56	0.33	0.13
		*112F26V16 - Proof of Closure (FM), 12 - 18 sec.									
		Maximum Press. Diff.	PSI		50	50	50	20	8	8	4
		Shipping Weight	Lb		25	25	30	35	54	52	118
Automatic Valves	H118A	*122 - Standard Valve or	Pd		1.11	0.7	0.4	8.55	6.67	2.54	1
		*122F26V16 - Proof of Closure (FM), 12 - 18 sec.									
		Maximum Press. Diff.	PSI		35	35	25	15	15	15	15
		Shipping Weight	Lb		22	23	28	32	52	54	148
Automatic Valves	Maxon	5000 - 6 sec.	Pd		0.76	0.16	0.11	4.18	1.93	1.04	
		Maximum Press. Diff.	PSI		125	100	70	70	40	30	
		5000 CP - 6 sec.	Pd						0.34	0.16	0.10*
	Maximum Press. Diff.	PSI						50	50	50	
FM Proof of Closure is satisfied on these valves only by addition of an end switch. No capacity change is involved.											
Solenoid Valves	ITT - General Controls	K3A 1.5 PSI	Pd	4	1.66	0.88	0.5				
		K3A 5.0 PSI	Pd	2.15	1.02	0.56	0.41				
		S261 25PSI	Pd					5.38	2.89	1.88	
		Shipping Weight	Lb	3	3	3	4	21	38	54	

*Flanged

PRESSURE DROP THROUGH INDIVIDUAL COMPONENTS

TABLE 12 - Continued				Press. drop "w.c. @ 1,000 CFH				Pressure "w.c. @ 10,000 CFH				
				3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	
Strainers	Keckley	Style B, Screwed-3/64" Brass	Pd		0.54	0.32	0.13	3.5	1.78	0.94		
		40 Mesh Monel	Pd		0.77	0.46	0.19	0.5	2.6	1.35		
		Style A, Flanged-3/64" Brass	Pd									0.018*
		40 Mesh Monel	Pd									0.026
		Shipping Weight	Lb		5	5	6	15	25	37	130	
Piping	Schedule 40 - Pressure Drop per 100 Ft.		Pd	48.39	13.33	3.23	1.42	39.63	15.31	4.8	1.15	
	Black Iron Pipe	Pressure Drop per 90 Degree Elbow	Pd	1.02	0.31	0.134	0.063	2.2	0.78	0.38	0.13	
	*Normal Gas Train"	5 Ft. Plus 3 Elbows 10 Ft. Plus 3 Elbows	Pd Pd	5.3	1.71	0.59	0.25	9.91	4.29	1.56	0.44	

*Flanged

The data contained in Table 12 is taken from the various manufacturer's published bulletins. It is shown here as a convenient reference for selecting necessary components in making up special (non standard) gas trains.

How to use the data in Table 12. **EXAMPLE E2.20 Train.**

- List the selected components and the "w.c. pressure drop (Pd) for each, then total the pressure drop figures.

	<u>Component</u>	<u>Pd @ 10,000 CFH</u>	
EXAMPLE	2" 48601-08 Shut-off Valve	.09	
	2" RV Regulator	6.27	
	2" S261 Auto Valve	5.38	
	2" V5055 Auto Valve	7.23	
	2" 48601-08 Shut-off Valve	.09	
	2" 8BV-A Butterfly Gas Valve	.267	
	2" Piping (10 ft. + 3 ells)	<u>9.91</u>	
		Total Pd =	29.24

- Divide the required input MBh by the standard flow CFH shown, then square the result.

NOTE: The pressure drop for each component in Table 12 is based on 1,000 CFH flow rate for 1-1/2" size (and smaller) and 10,000 CFH flow rate for 2" size (and larger), both CFH rates based on gas with 1,000 Btu/cf and 0.60 s.g. See Table 11 for gases with other specifications.

EXAMPLE Required Burner Input = 3,000 MBh $\left(\frac{3000}{10000}\right)^2 = 0.09$
 Standard Flow = 10,000 CFH

- Multiply the result of 2 above by the total pressure drop obtained in 1 above.

EXAMPLE 0.09 X 29.24 = 2.63 "w.c. pressure drop through gas train selected for required burner input.

GAS PRESSURE REGULATORS FULL LOCK-UP (TIGHT SHUTOFF) TYPE

The following tables are intended to provide an indication of the proper regulator to select when a full lock-up or tight shutoff type is specified.

The maximum flow rates shown are in accordance with the manufacturer's published data sheets. The outlet pressure of a regulator is the algebraic sum of the total downstream resistance to the high fire rate of the burner. The sum includes the pressure drop through the (1) gas train, (2) the butterfly valve, if used, (3) the burner orifice requirements and, (4) the firebox pressure at the high fire rate.

TABLE 13

Regulator Size & Model	Mfr. 3	Maximum Operating Inlet Press.	Maximum Emergency Pressure (without damage)			Ship Wt. Lbs.	FLOW RATES - CFH OF GAS WITH 0.60 SPECIFIC GRAVITY 2						
			Body Inlet Press.	Diaphragm Press.	Diaphragm Case Press.		Inlet Outlet	2 Lbs. 7" w.c.	2 Lbs. 18" w.c.	2 Lbs. 1 Lb.	5 Lbs. 1 Lb.	10 Lbs. 1 Lb.	15 Lbs. 2 Lbs.
3/4" R122-6	Rockwell	15	20	Set Point Plus 2 PSI	5	10	Maximum	3400	2500	2800	4950	6000	6800
1" R122-8	Rockwell	15	20	Set Point Plus 2 PSI	5	15	Maximum	5500	4000	4500	8000	9700	11000
1-1/4" R122-8	Rockwell	15	20	Set Point Plus 2 PSI	5	15	Maximum	7000	5700	6000	9100	14900	14000
1-1/2" R122-12	Rockwell	15	20	Set Point Plus 2 PSI	5	28	Maximum	10000	9000	9500	12700	14000	18000
2" R122-12	Rockwell	15	20	Set Point Plus 2 PSI	5	28	Maximum	18000	16500	16900	29000	33000	36000

TABLE 13 (Continued)

Regulator Size & Model	Mfr. 3	Maximum Operating Inlet Press.	Maximum Emergency Pressure (without damage)			Ship Wt. Lbs.	FLOW RATES - CFH OF GAS WITH 0.60 SPECIFIC GRAVITY 2						
			Body Inlet Press.	Diaphragm Press.	Diaphragm Case Press.		Inlet Outlet	2 Lbs. 7" w.c.	2 Lbs. 18" w.c.	5 Lbs. 1 Lb.	10 Lbs. 2 Lb.	25 Lbs. 2 Lb.	60 Lbs. 2 Lbs.
R121-8 1" X 1" 1-1/4" X 1-1/4"	Rockwell	60	70	Set Point Plus 5 PSI	25	30	Maximum Maximum	6000 7500	5000 6000	9800 10800	12200 15400	21400 24900	42000 52100
R121-12 1-1/2" X 1-1/2" 2" X 2" 2-1/2" X 2-1/2"	Rockwell	60	70	Set Point Plus 5 PSI	20	60	Maximum Maximum Maximum	11000 20000 22000	9500 17500 19100	18000 34000 37600	25100 49000 53000	46000 84500 94000	87000 170000 188000
R121-16 3" X 3"	Rockwell	40	50	Set Point Plus 2 PSI	10	90	Maximum	46000	34000	75000	N.A.	N.A.	N.A.

1 Maximum inlet pressure is the maximum allowable for proper and/or continuous operation. Maximum exposure pressure is the maximum which can be safely contained by the regulator. Any pressure in excess of the "maximum inlet pressure" will cause faulty operation and/or internal damage and should be considered an emergency condition only.

2 To obtain capacity figures for gases with a specific gravity other than 0.60, divide the capacities shown above by the figure shown in the specific gravity Table 11.

3 John Zink furnishes R122 regulators with "Internal Control" and R121 regulators with "External Control". See regulator instruction bulletin for installation guidelines.

ABBREVIATION N.A. - Not Available

GAS PRESSURE REGULATORS HIGH PRESSURE LOCK-UP (NON-TIGHT SHUTOFF) TYPE

The following table is intended to provide an indication of the proper regulator to select.

The maximum flow rates shown are in accordance with the manufacturer's published data sheets. The outlet pressure of a regulator is the algebraic sum of the total downstream resistance to the high fire rate of the burner. The sum includes the pressure drop through the (1) gas train, (2) the butterfly valve, if used, (3) the burner orifice requirements and, (4) the firebox pressure at the high fire rate.

TABLE 14

Regulator Size & Model	Mfgr.	Maximum Operating Inlet Pressure	Maximum Emergency Pressure Without Damage	Flow Rates - CFH of Gas with 0.60 Specific Gravity 2											
				Pressure Drop (inches w.c.)											
				0.1	0.3	0.5	1.0	3.0	5.0	7.0	1/2 psi	3/4 psi	1 psi	2 psi	3 psi
210D 1" X 1" 1-1/4" X 1-1/4" 1-1/2" X 1-1/2"	Maxitrol	10	25	--	--	--	900	1600	2000	2400	3300	4100	4750	6700	8200
				--	--	--	1100	1900	2500	2900	4100	5000	5850	8250	10000
				--	--	--	1200	2100	2700	3200	4500	5500	6350	9000	11000
210E 1-1/2" X 1-1/2" 2" X 2"	Maxitrol	10	25	--	1000	1300	1800	3100	4000	4800	6700	8250	9500	13500	16500
				--	1100	1400	2000	3500	4500	5300	7500	9100	10600	15000	18300
210G 2-1/2" X 2-1/2" 3" X 3"	Maxitrol	10	25	1250	2200	2825	4000	7000	9000	10500	15000	18500	21200	30000	36700
				1455	2500	3100	4600	8000	10300	12200	17200	21100	24350	34500	42000
210J 4" X 4"	Maxitrol	10	25	2700	4700	6000	8600	15000	19000	23000	32000	40000	45500	65000	78700

- 1 Maximum inlet pressure is the maximum allowable for proper and/or continuous operation. Maximum exposure pressure is the maximum which can be safely contained by the regulator. Any pressure in excess of the "maximum inlet pressure" will cause faulty operation and/or internal damage and should be considered an emergency condition only.
- 2 To obtain capacity figures for gases with a specific gravity other than 0.60, divide the capacities shown above by the figure shown in the specific gravity Table 11.
- 3 Due to the non-tight shutoff design of these regulators, the safety shutoff gas valves used must be able to withstand the maximum gas pressure available at the inlet of the regulator.