

Performance Data on Jet Compressors



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PERFORMANCE

To help you evaluate jet compressors in terms of your particular requirement the following performance criteria should be considered.

Jet compressors can be divided into two categories based upon the type of performance.

The first category is termed “noncritical” in performance. If the absolute pressure at the compressor discharge is less than 1.8 times the absolute pressure at the suction (for instance, suction pressure 15 psia - discharge pressure 27 psia), the performance is noncritical.

When performance is noncritical, a constant pressure can be maintained at the suction of a compressor, at varying capacities, by controlling motive flow.

The second category is termed “critical” in performance. If the compression ratio (ratio of absolute discharge pressure to absolute suction pressure) is over 1.8 to 1 (for instance, 20 psia is 36 psia), the performance is critical.

When performance is critical, control cannot be exerted by means of the motive fluid. In order to control the suction pressure of such a unit at varying process loads, it is necessary to maintain a constant load on the compressor by addition of a secondary suction fluid, or to vary the suction pressure at the compressor by introducing an artificial pressure drop in the suction line.

Most jet compressors are operated at low compression ratios and are noncritical in performance. Should there be any question about control or performance, please check with S&K Engineers.

SIZING CHARTS

To find out whether or not a jet compressor will provide desired performance and the size required to meet requirements, refer to the charts on pages 3 through 6 for thermocompressors and to the charts on pages 7 and 8 for other gases.

TABLE 1. THERMAL DATA FOR GASES
(for use in ordinary calculations)

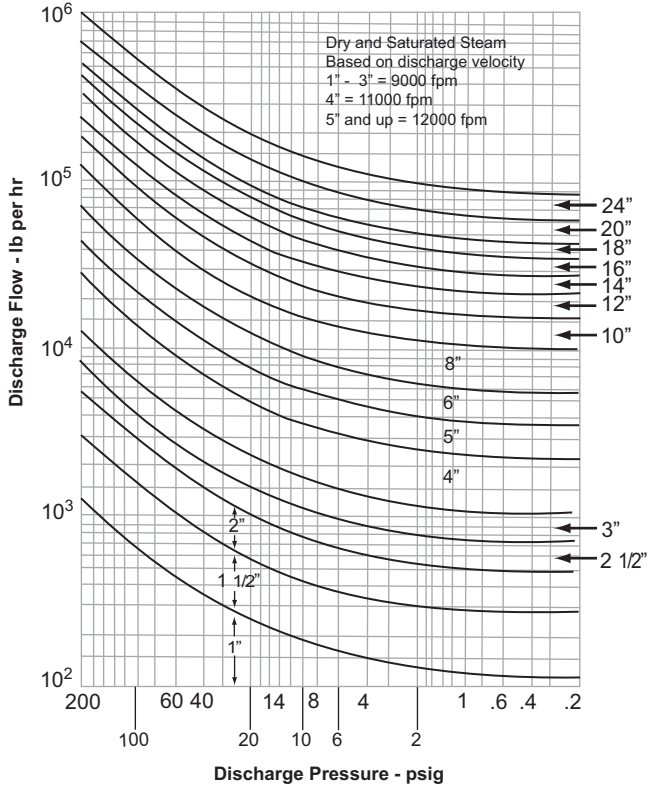
Gas	Formula	Molecular Weight (Lb/Mol.)	Specific Heat at Atmospheric Pressure & Temp. of 200°C	Ratio of Specific Heats at 0°C & Low Pressure $\gamma = \frac{C_p}{C_v}$
Helium	He	4.002	1.25	1.66
Argon	Ar	39.944	0.12	1.66
Hydrogen	H ₂	2.016	3.43	1.409
Nitrogen	N ₂	28.016	0.25	1.400
Oxygen	O ₂	32	0.22	1.399
Air	-	28.967	0.24	1.402
Carbon Monoxide	CO	28.00	0.25	1.400
Nitric Oxide	NO	30.008	0.20	1.385
Hydrogen Chloride	HCl	36.465	0.19	1.40
Hydrogen Sulfide	H ₂ S	34.002	0.25	1.3
Carbon Dioxide	CO ₂	44.00	0.20	1.301
Nitrous Oxide	N ₂ O	44.016	0.21	1.270
Sulfur Dioxide	SO ₂	64.06	0.15	1.272
Water Vapor	H ₂ O	18.016	0.47	1.3
Ammonia	NH ₃	17.032	0.52	1.313
Acetylene	C ₂ H ₂	26.016	0.38	1.255
Methane	CH ₄	16.031	0.56	1.319
Natural Gas (sp. gr. 0.62)	-	18.0	0.56	1.3
Methyl Chloride	CH ₃ Cl	50.48	0.24	1.29
Ethylene	C ₂ H ₄	28.031	0.40	1.249
Ethane	C ₂ H ₆	30.047	0.39	1.20
Ethyl Chloride	C ₂ H ₅ Cl	64.50	0.28	1.16
Propane	C ₃ H ₈	44.094	0.5	1.128
Butane-n	C ₄ H ₁₀	58.12	0.5	1.088

SYMBOLS USED BY S&K IN THERMODYNAMIC FORMULAS

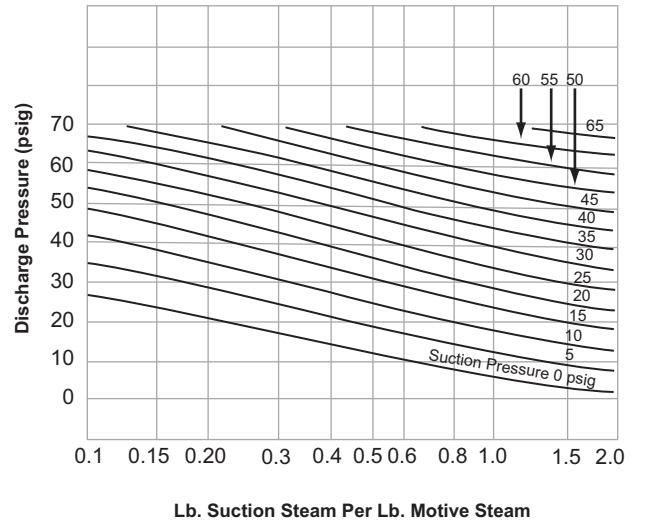
The symbols below are common to this and similar type problems. Check gas tables for thermodynamic properties.

- M₁ = Molecular weight of primary gas
- M_s = Molecular weight of secondary gas
- M₂ = Molecular weight of discharged gas
- t₁ = Temperature of primary gas in degrees F
- t_s = Temperature of secondary gas in degrees F
- t₂ = Temperature of discharge gas in degrees F
- P₁ = Pressure of primary gas in psia
- P_s = Pressure of secondary gas in psia
- P₂ = Pressure of discharge gas in psia
- C_{p1} = Specific heat of primary gas at a constant pressure
- C_{ps} = Specific heat of secondary gas at a constant pressure
- C_{p2} = Specific heat of mixed gas at a constant pressure
- $\gamma_1 = \frac{C_{p1}}{C_{v1}}$ = Specific heat ratio of primary gas
- $\gamma_2 = \frac{C_{p2}}{C_{v2}}$ = Specific heat ratio of mixed gas
- Pr₁ = Pressure ratio of secondary to primary gas pressure, P_s/P₁
- Pr₂ = Pressure ratio of secondary to discharge gas pressure, P_s/P₂
- R_w = Weight ratio of secondary gas to primary gas

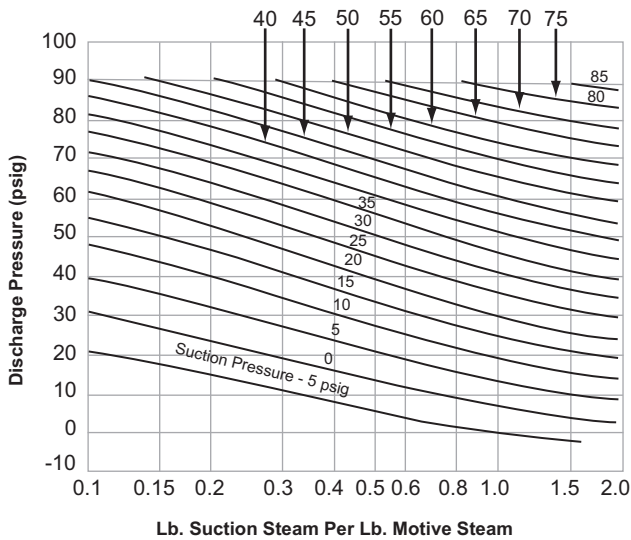
**Chart A - Sizing Chart
for Thermocompressors
(Types 420, 425, 426, 427, 439)**



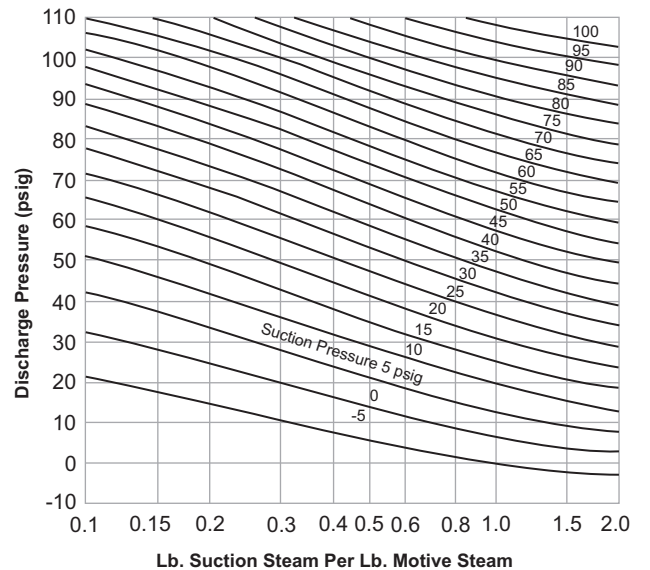
**Chart B - Capacity Ratios of
Steam Jet Thermocompressors
100 psig Operating Live Steam**



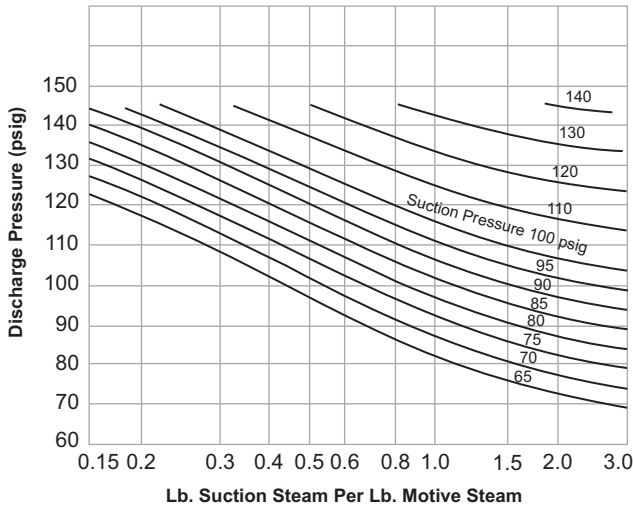
**Chart C - Capacity Ratios of
Steam Jet Thermocompressors
125 psig Operating Live Steam**



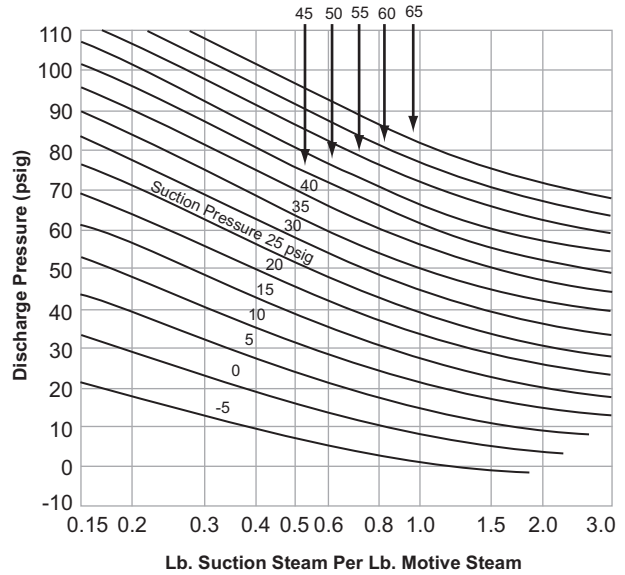
**Chart D - Capacity Ratios of
Steam Jet Thermocompressors
150 psig Operating Live Steam**



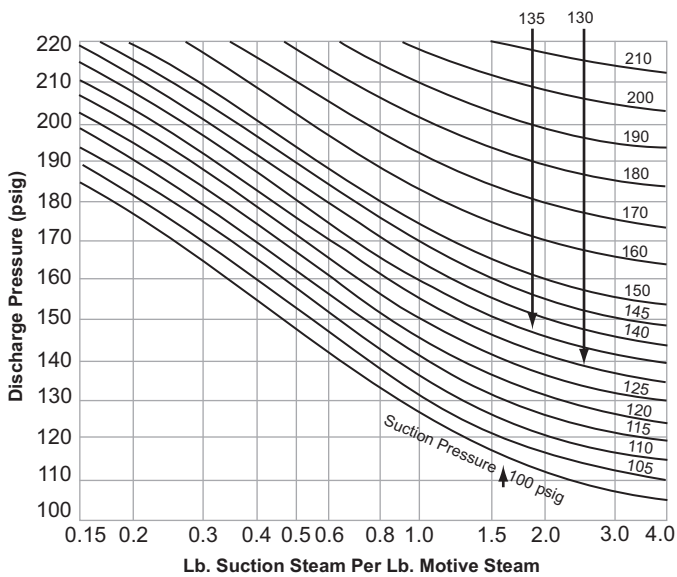
**Chart E - Capacity Ratios of Steam Jet Thermocompressors
200 psig Operating Live Steam**



**Chart F - Capacity Ratios of Steam Jet Thermocompressors
200 psig Operating Live Steam**



**Chart G - Capacity Ratios of Steam Jet Thermocompressors
300 psig Operating Live Steam**



**Chart H - Capacity Ratios of Steam Jet Thermocompressors
300 psig Operating Live Steam**

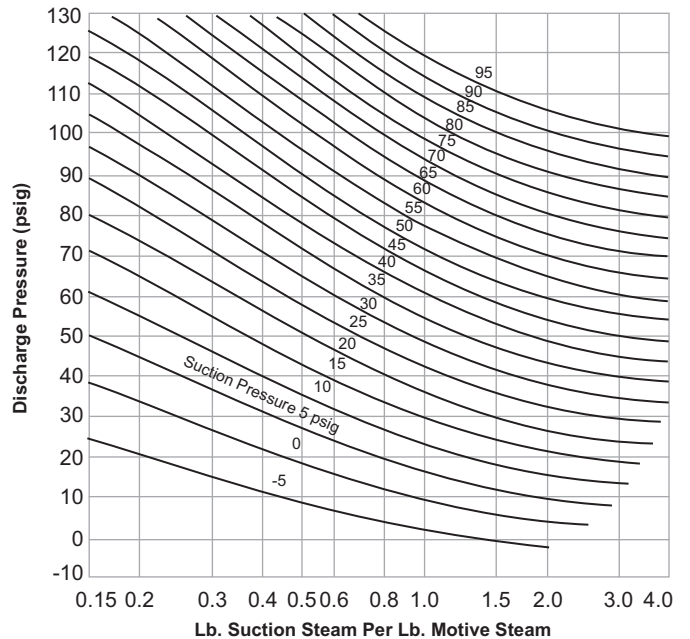


Chart I - Capacity Ratios of Steam Jet Thermocompressors 400 psig Operating Live Steam

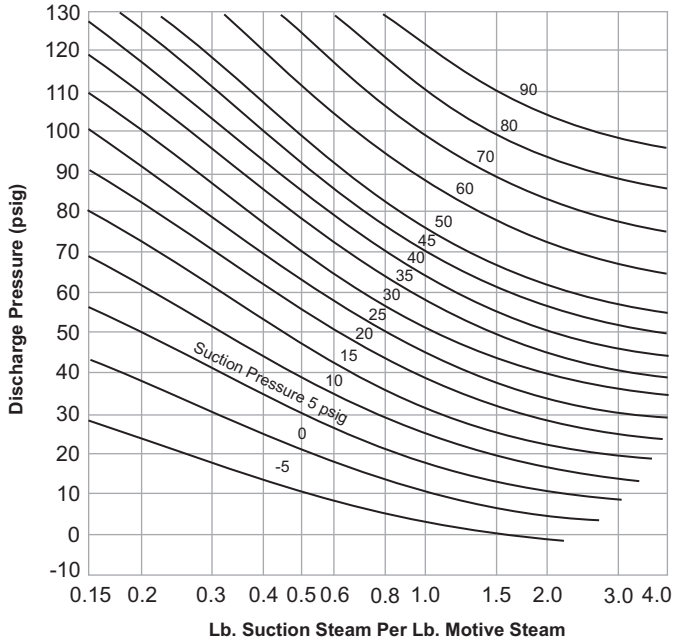


Chart J - Capacity Ratios of Steam Jet Thermocompressors 400 psig Operating Live Steam

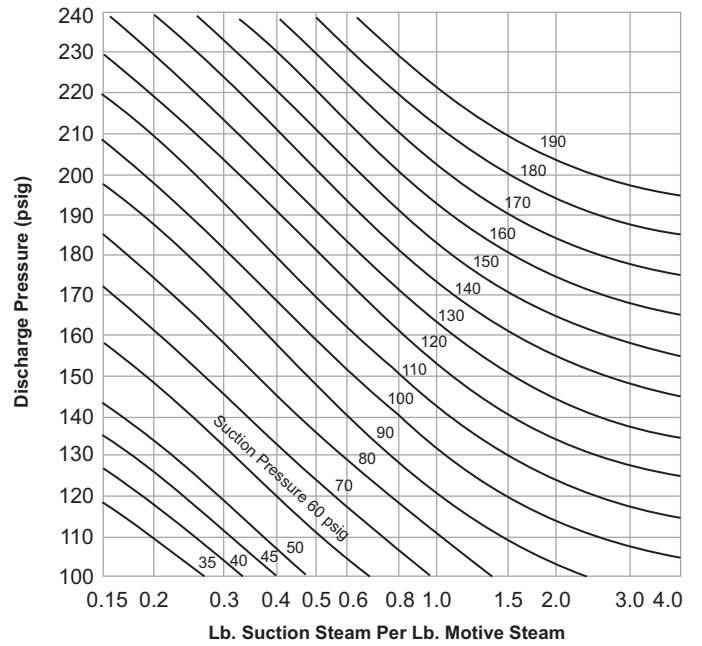


Chart K - Capacity Ratios of Steam Jet Thermocompressors 400 psig Operating Live Steam

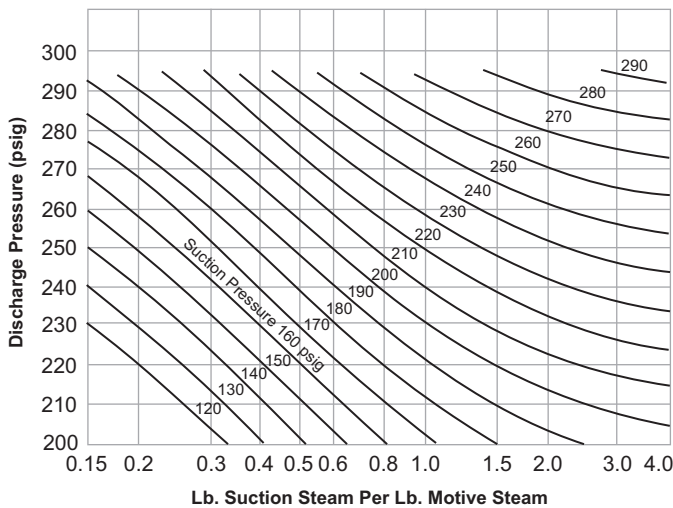
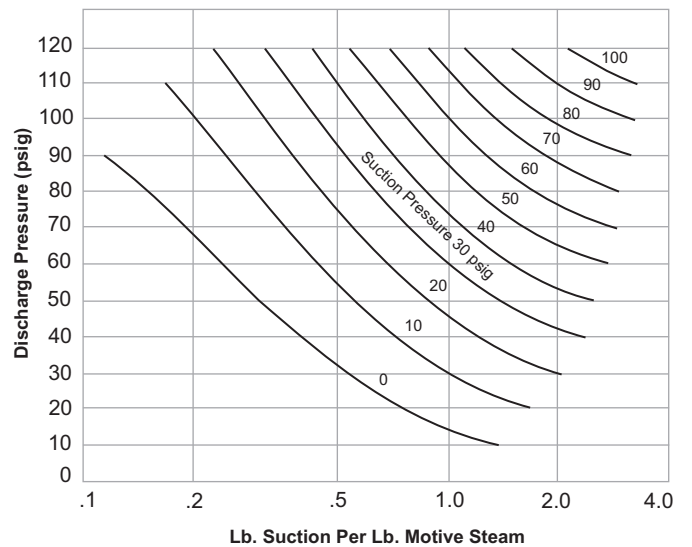
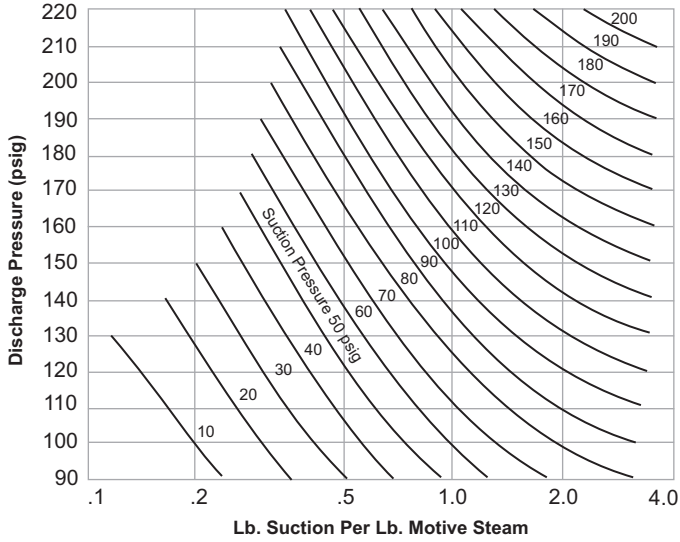


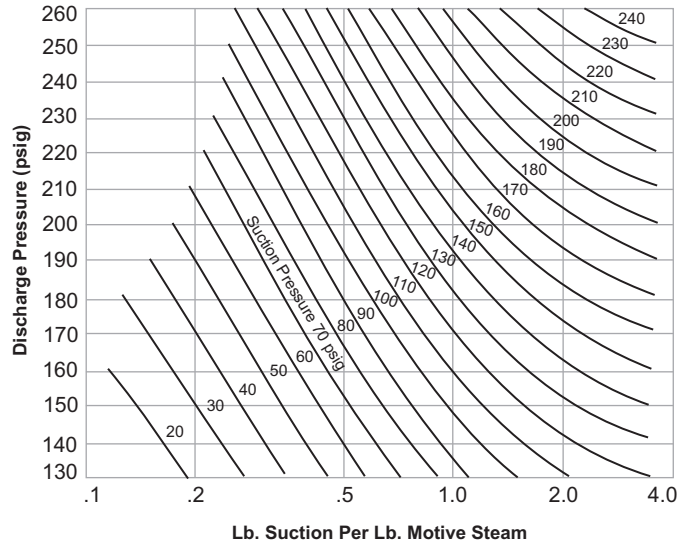
Chart L - Capacity Ratios of Steam Jet Thermocompressors 600 psig and 600°F.



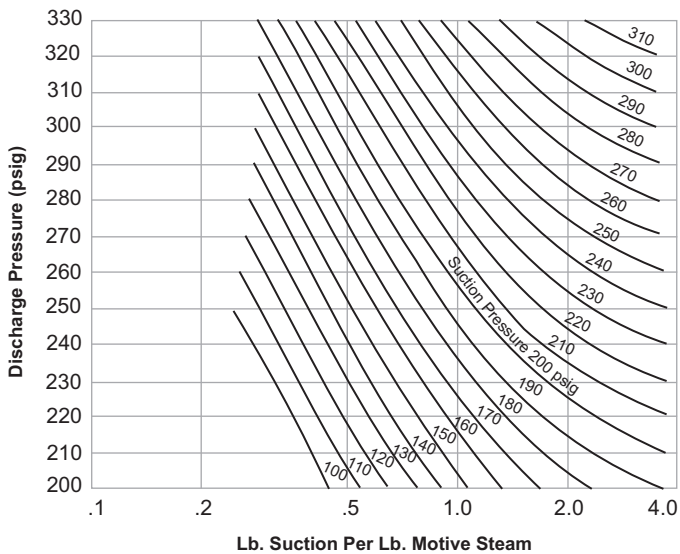
**Chart M - Capacity Ratios of Steam Jet Compressors
600 psig and 600°F.**



**Chart N - Capacity Ratios of Steam Jet Thermocompressors
600 psig and 600°F.**



**Chart O - Capacity Ratios of Steam Jet Thermocompressors
600 psig and 600°F.**



**Chart P - Capacity Ratios of Steam Jet Thermocompressors
600 psig and 600°F.**

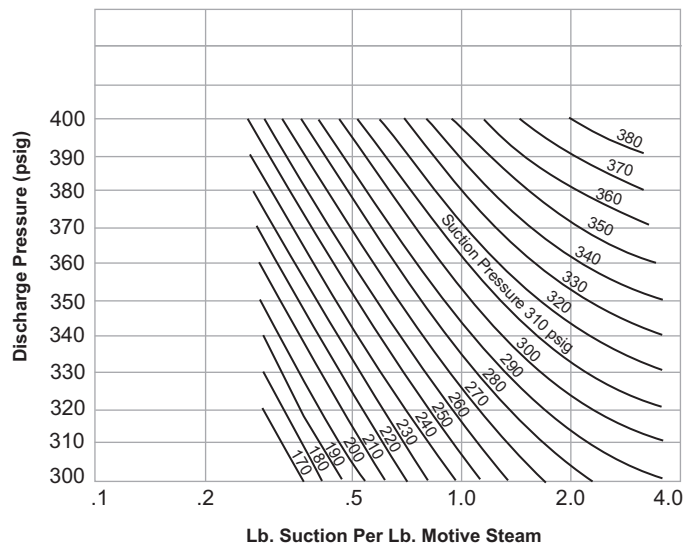


Chart Q - Propane-Air Back Pressure Curves

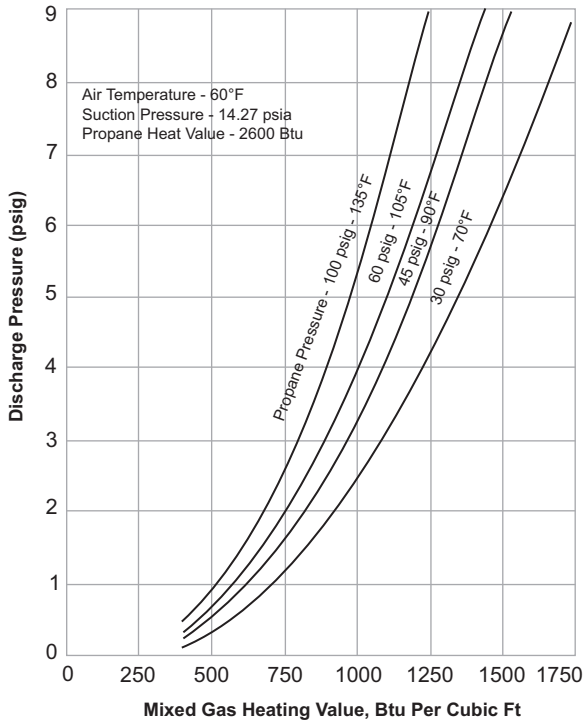


Chart R - Propane-Air Capacity Curves For 2" Type 420 Gas Jet Compressors

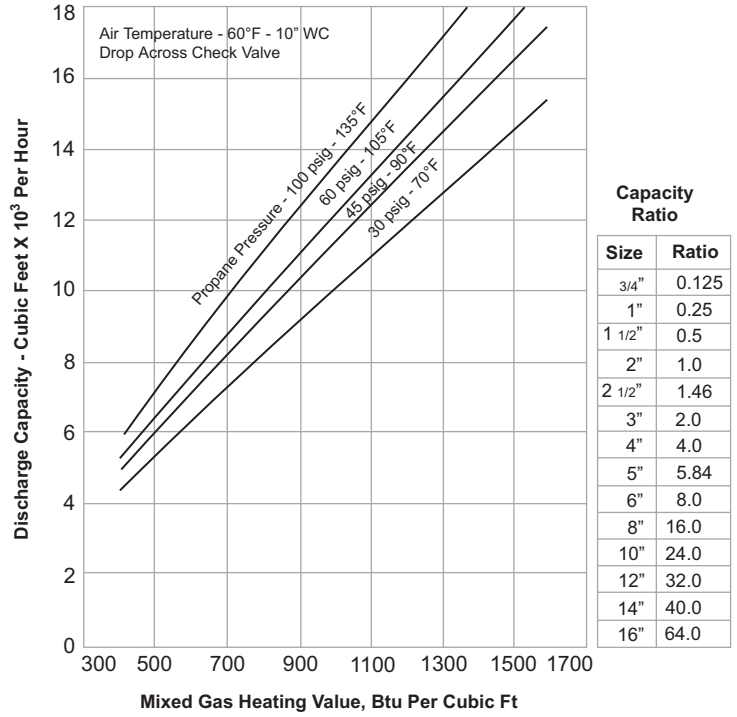


Chart S - Butane-Air Back Pressure Curves

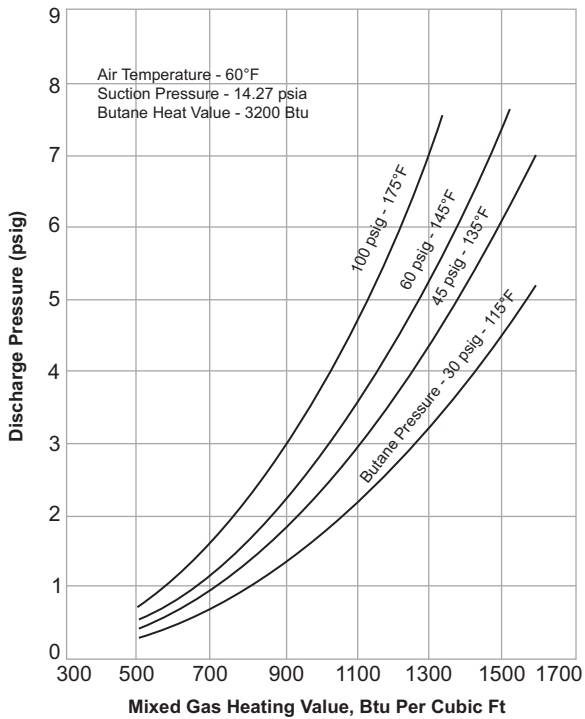


Chart T - Butane-Air Capacity Curves For 2" Type 420 Gas Jet Compressors

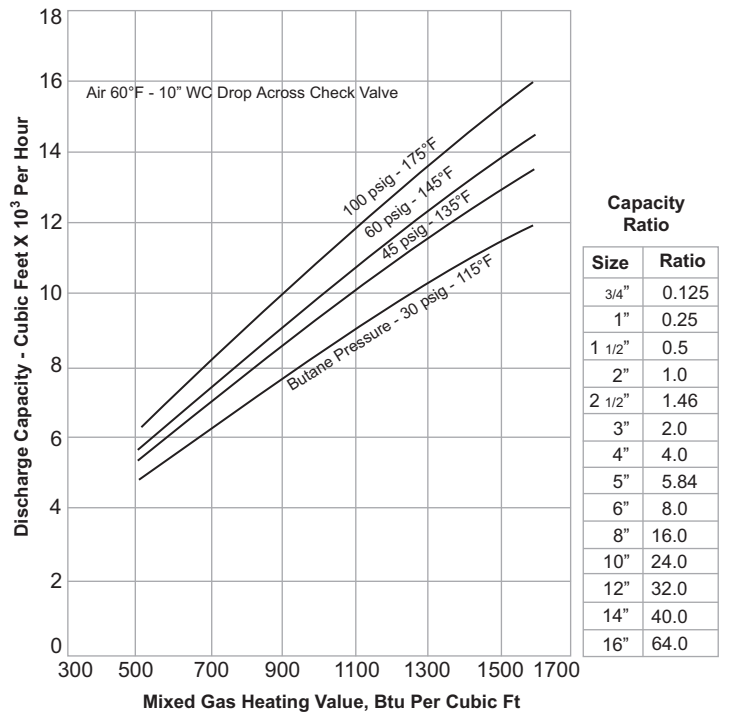


Chart U - Natural Gas-Air Back Pressure Curves

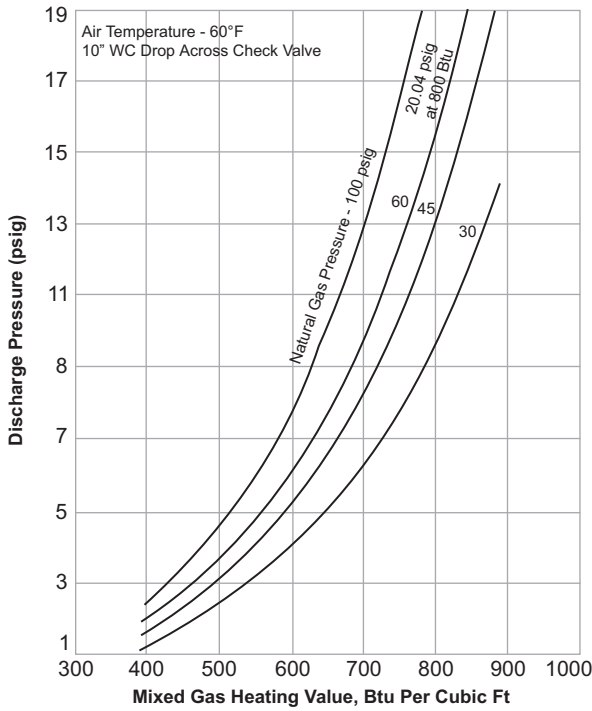


Chart V - Natural Gas-Air Capacity Curves For 2" Type 420 Gas Jet Compressors

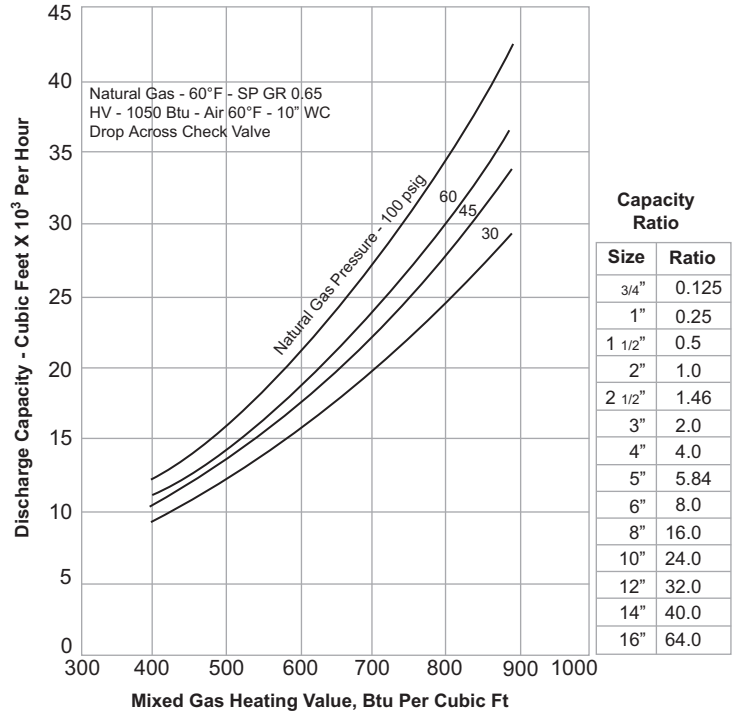


Chart W - Air-Air Back Pressure Curves For Type 420 Air Jet Compressors

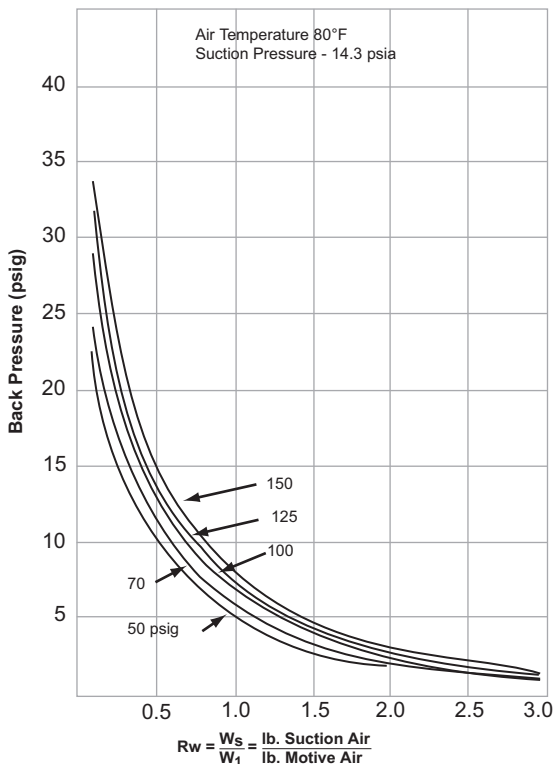


Chart X - Air-Air Capacity Curves For 2" Type 420 Air Jet Compressors

