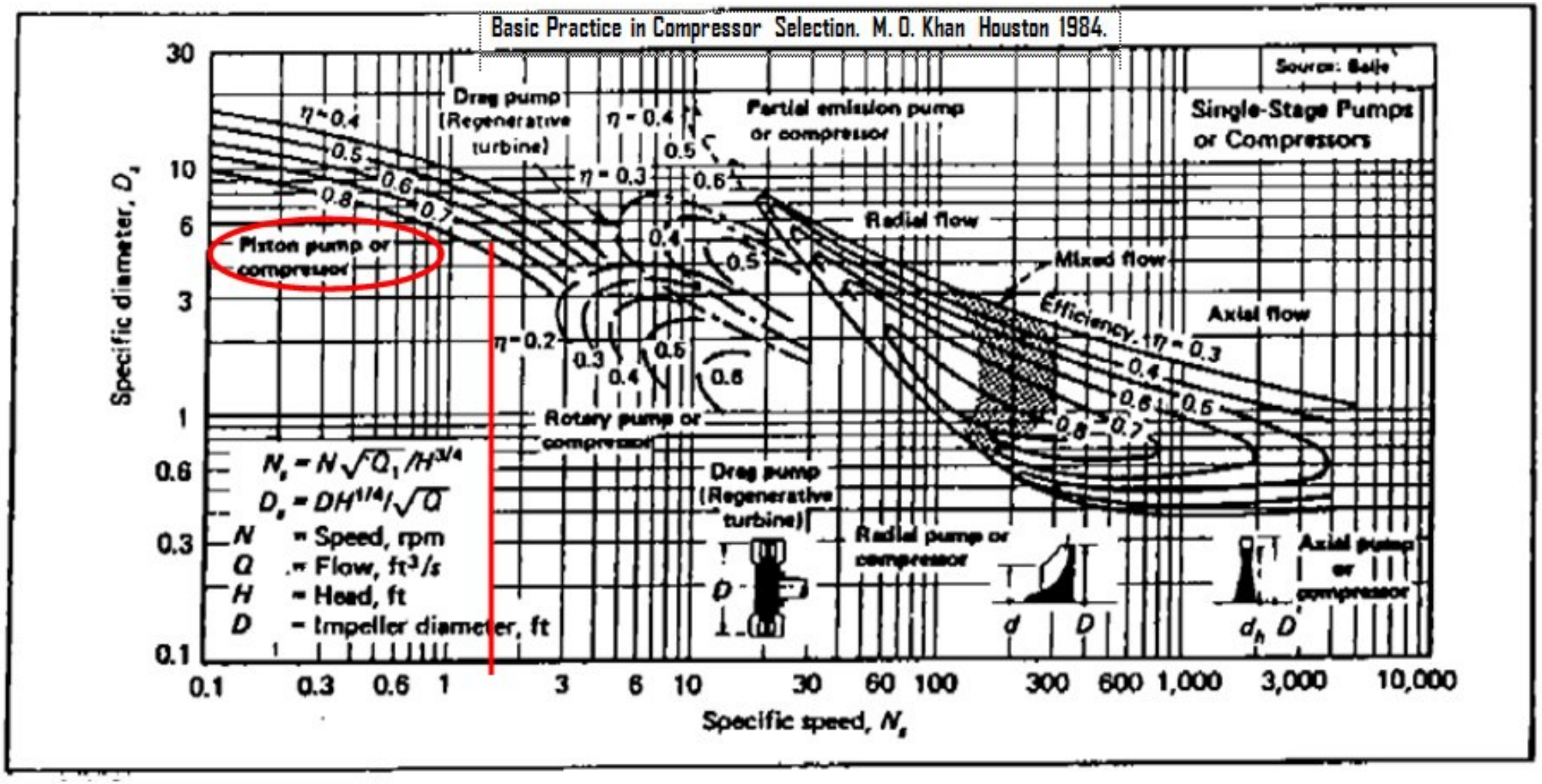
Molar Heat Capacity MC_p (Ideal-Gas State), Btu/(lb mol • °R)

*Data source: Selected Values of Properties of Hydrocarbons, API Research Project 44; MW updated to agree with Fig. 23-2

Gas	Chemical formula	Mol wt	Temperature							
			0°F	50°F	60°F	100°F	150°F	200°F	250°F	300°F
Methane	CH_4	16.043	8.23	8.42	8.46	8.65	8.95	9.28	9.64	10.01
Ethyne (Acetylene)	C_2H_2	26.038	9.68	10.22	10.33	10.71	11.15	11.55	11.90	12.22
Ethene (Ethylene)	C_2H_4	28.054	9.33	10.02	10.16	10.72	11.41	12.09	12.76	13.41
Ethane	C_2H_6	30.070	11.44	12.17	12.32	12.95	13.78	14.63	15.49	16.34
Propene (Propylene)	C_3H_6	42.081	13.63	14.69	14.90	15.75	16.80	17.85	18.88	19.89
Propane	C_3H_8	44.097	15.65	16.88	17.13	18.17	19.52	20.89	22.25	23.56
1-Butene (Butlyene)	C_4H_8	56.108	17.96	19.59	19.91	21.18	22.74	24.26	25.73	27.16
cis-2-Butene	C_4H_8	56.108	16.54	18.04	18.34	19.54	21.04	22.53	24.01	25.47
trans-2-Butene	C_4H_8	56.108	18.84	20.23	20.50	21.61	23.00	24.37	25.73	27.07
iso-Butane	C_4H_{10}	58.123	20.40	22.15	22.51	23.95	25.77	27.59	29.39	31.11
n-Butane	C_4H_{10}	58.123	20.80	22.38	22.72	24.08	25.81	27.55	29.23	30.90
iso-Pentane	C_5H_{12}	72.150	24.94	27.17	27.61	29.42	31.66	33.87	36.03	38.14
n-Pentane	C_5H_{12}	72.150	25.64	27.61	28.02	29.71	31.86	33.99	36.08	38.13
Benzene	C_6H_6	78.114	16.41	18.41	18.78	20.46	22.45	24.46	26.34	28.15
n-Hexane	C_6H_{14}	86.177	30.17	32.78	33.30	35.37	37.93	40.45	42.94	45.36
n-Heptane	C_7H_{16}	100.204	34.96	38.00	38.61	41.01	44.00	46.94	49.81	52.61
Ammonia	NH_3	17.0305	8.52	8.52	8.52	8.52	8.52	8.53	8.53	8.53
Air		28.9625	6.94	6.95	6.95	6.96	6.97	6.99	7.01	7.03
Water	H_2O	18.0153	7.98	8.00	8.01	8.03	8.07	8.12	8.17	8.23
Oxygen	O_2	31.9988	6.97	6.99	7.00	7.03	7.07	7.12	7.17	7.23
Nitrogen	N_2	28.0134	6.95	6.95	6.95	6.96	6.96	6.97	6.98	7.00
Hydrogen	H_2	2.0159	6.78	6.86	6.87	6.91	6.94	6.95	6.97	6.98
Hydrogen sulfide	H_2S	34.08	8.00	8.09	8.11	8.18	8.27	8.36	8.46	8.55
Carbon monoxide	CO	28.010	6.95	6.96	6.96	6.96	6.97	6.99	7.01	7.03
Carbon dioxide	CO_2	44.010	8.38	8.70	8.76	9.00	9.29	9.56	9.81	10.05

* Exceptions: Air - Keenan and Keyes, Thermodynamic Properties of Air, Wiley, 3rd Printing 1947. Ammonia - Edw. R. Grabl, Thermodynamic Properties of Ammonia at High Temperatures and Pressures, Petr. Processing, April 1953. Hydrogen Sulfide - J. R. West, Chem. Eng. Progress, 44, 287, 1948.


Basic Practice in Compressor Selection. M. O. Khan Houston 1984.
Source: Balje
Single-Stage Pumps or Compressors
Specific diameter, D_s
Specific speed, N_s
30
10
6
3
1
0.6
0.3
0.1
0.1
0.3
0.6
1
3
6
10
30
60
100
300
600
1,000
3,000
10,000
Drag pump (Regenerative turbine)
Partial emission pump or compressor
Radial flow
Mixed flow
Axial flow
Efficiency, η
Piston pump or compressor
Rotary pump or compressor
Drag pump (Regenerative turbine)
Radial pump or compressor
Axial pump or compressor
$N_s = N\sqrt{Q_1}/H^{3/4}$
$D_s = DH^{1/4}/\sqrt{Q}$
N = Speed, rpm
Q = Flow, ft³/s
H = Head, ft
D = Impeller diameter, ft

Physical Constants of Gases

Compound	Formula	Mol. wt. M	c_p and c_p/c_v at 14.7 psia and 60°F		Critical constants		Mc_p at 60°F	Mc_p at 100°F	Mc_p at 200°F
			c_p	c_p/c_v	Pressure, psia P_c	Temp, °R T_c			
Acetylene	C_2H_2	26.036	0.3966	1.238	905.0	557.4	10.33	10.69	11.53
Air	N^+O_2	28.966	0.2470	1.395	547	238.7	6.96	6.96	6.99
Ammonia	NH_3	17.032	0.5232	1.310	1,657	731.4	8.91	8.57	9.02
Benzene	C_6H_6	78.108	0.2404	1.118	714	1,013.0	18.78	20.47	24.46
1,2-Butadiene	C_4H_6	54.088	(0.3458)	(1.12)	653	799.0	18.70		
1,3-Butadiene	C_4H_6	54.088	(0.3412)	1.12	628	766.0	18.45		
N-Butane	C_4H_{10}	58.120	0.3970	1.094	550.7	765.6	23.07	24.51	26.16
Isobutane	C_4H_{10}	58.120	0.3872	1.097	529.1	734.9	22.50	23.96	27.62
N-Butene	C_4H_8	56.104	0.3703	1.105	583	755.6	20.77	22.09	25.18
Isobutene	C_4H_8	56.104	0.3701	1.106	579.8	752.5	20.76		
Butylene	C_4H_8	56.104	0.3703	1.105	583	755.6	20.78	21.94	24.86
Carbon dioxide	CO_2	44.010	0.1991	1.300	1,073	548.0	8.76	9.00	9.35
Carbon monoxide	CO	28.010	0.2484	1.403	510	242.0	6.96	6.96	6.98
Chlorine	Cl_2	70.914	0.1149	1.366	1,120	751	8.15		
Ethane	C_2H_6	30.068	0.4097	1.193	708.3	550.1	12.32	12.96	14.68
Ethyl alcohol	C_2H_5OH	46.069	0.3070	1.130	927.0	929.6	14.14		
Ethylene	C_2H_4	28.052	0.3622	1.243	742.1	509.8	10.16	10.68	12.08
N-Hexane	C_6H_{14}	86.172	0.3984	(1.062)	439.7	914.5	34.33	36.23	41.08
Helium	He	4.003	1.2480	1.6598	480	510	5.00		
Hydrogen	H_2	2.016	3.408	1.408	188.0	60.2	6.87	6.90	6.95
Hydrogen sulfide	H_2S	34.076	0.254	1.323	1,306	672.7	8.66	8.18	8.36
Methane	CH_4	16.042	0.5271	1.311	673.1	343.5	8.46	8.65	9.30
Methyl alcohol	CH_3OH	32.042	0.2700	1.203	1,157.0	924.0	8.65		
Nitrogen	N_2	28.016	0.2482	1.402	492.0	227.2	6.95	6.96	6.963
N-Octane	C_8H_{18}	114.224	0.3998	(1.046)	362.1	1,025.2	45.67		
Oxygen	O_2	32.00	0.2188	1.401	730	278.2	7.00	7.03	7.120
N-Pentane	C_5H_{12}	72.146	0.3972	1.074	489.5	845.9	28.66	30.30	34.41
Isopentane	C_5H_{12}	72.146	0.3880	1.075	483.0	830.0	27.99	29.90	34.44
Propane	C_3H_8	44.094	0.3885	1.136	617.4	666.2	17.13	18.21	20.90
Propylene	C_3H_6	42.078	0.3541	1.154	667	657.4	14.90	15.77	17.88
Sulfur dioxide	SO_2	64.060	0.1470	1.246	1,142	775.0	9.42		
Toluene	C_7H_8	92.134	0.2599	1.091	611	1,069.5	23.95		
Water	H_2O	18.016	0.4446	1.335	3,206	1,165.4	8.01	8.03	8.12
Hydrogen chloride	HCl	36.465	0.1939	1.410	1,199.2	584.5	7.07		