كلية الهندسة
قسم: هندسة النفط
الزمن: ثلاث ساعات
Closed Book

جامعة مصراته
خريف: 2014/2013
الامتحان النهائي لمقرر: هندسة إنتاج II
تاريخ الامتحان : 2014/01/25
عدد أوراق الأسئلة: 2 صفحة

Q1) **1) What is the Advantages of Gas Lift ?** *(2 Marks)*

2) Injection gas pressure at surface, P_{cwh} = 980 psig
Gas Sp.gr (Condensate) = 0.7
Depth gas Injection@ 8000 ft
Gas Temperature at surface, T_{surf} = 80°F
Gas Temperature at depth, T_f = 140°F
Calculate the pressure at the injection point (P_{depth})?

(7 Marks)

Q2) **I) Complete: High Viscosity..... PI and Low.....** (3 Marks)

If → $\Delta P_{min} = 0$ → Pt = ...
If → ΔP_{max} → Pt =.....

II) Oil well Produced @ 8000 ft ; Gas volume = 4400 scf
Tubing Size = 1.995 in ; API = 33 S=7%
Dome Pressure = 900 Psi ; P_{wh} = 100 Psi
Separator Pressure= 100 Psi ; R = 0.15
Compare between Horner and Brown Method's ?
Calculate a) Flow Rate (Q_{oil}).
b) GOR Required.
c) Total Volume of Gas per Day.

(12 Marks)

Q3) **I) The Valve Mechanisms Objectives to?.....** (2 mark)

II) Given :

P_{CH}= 600 Psi	D = 8000 ft	P'_e = 3567 Psi
Qo = 100 STB/DAY	J = 0.3 STB/day/Psi	dt = 2"
Pth = 0	Gs = 0.50 Psi/ft	Gf = 0.04 Psi/ft
Aa/At= 2.6	St = 100 Psi	Av/Ab = 0.11

Bottom valve to be set at 4250 ft
Valve opening Pressure = 550 , 525 , 500 , 475 , 450 , Psi , at 60°F

Calculate: **1) Depth for each Valve.**
2) Pressure at each valve depth.
Where: $P_{depth} = P_{surface}(1+Dv/40000)$, Psi

(8 Marks)

Q4) **I) How can we change the flow rate in Sucker Rod Pump?** (3 Marks)
II) Well is equipped with a 1.5 inch plunger. The. Production at the surface is 207 BLL/Day of fluid SP.g =0.85 , the Volumetric Eff. (69%) , Pump Speed (20 SPM). Calculate the Plunger Stroke Length.

(5 Marks)

Q5) I) Given:

$dt = 2$ in	;	$\gamma g = 0.65$
$D_f = 8000$ ft	;	$P_{chi} = 1200$ Psi
$P_{sep} = 0$ Psi	;	50% (Water Production)
$Pe = 1920$ Psi	;	$P_{wh} = 120$ Psi
$G_s = 0.4\frac{Psi}{ft}$	;	$G_f = 0.04\ \frac{Psi}{ft}$
$Q = 300$STB/D	;	$J_L = 5$Stb/D/Psi
API = 35°	;	Pb = 1500 Psi

Vertical flowing

Required Using Graphical Method:

1) Valve Spacing & Valve Depth.
2) Number of Valve.

(10 Marks)

II) At the best Efficiency Point on curve When the pump produces a THD (total dynamic head) of 6000 ft. Gravity of the produced fluid 40°API. Calculate the Number of stages and total Pump Horse Power.

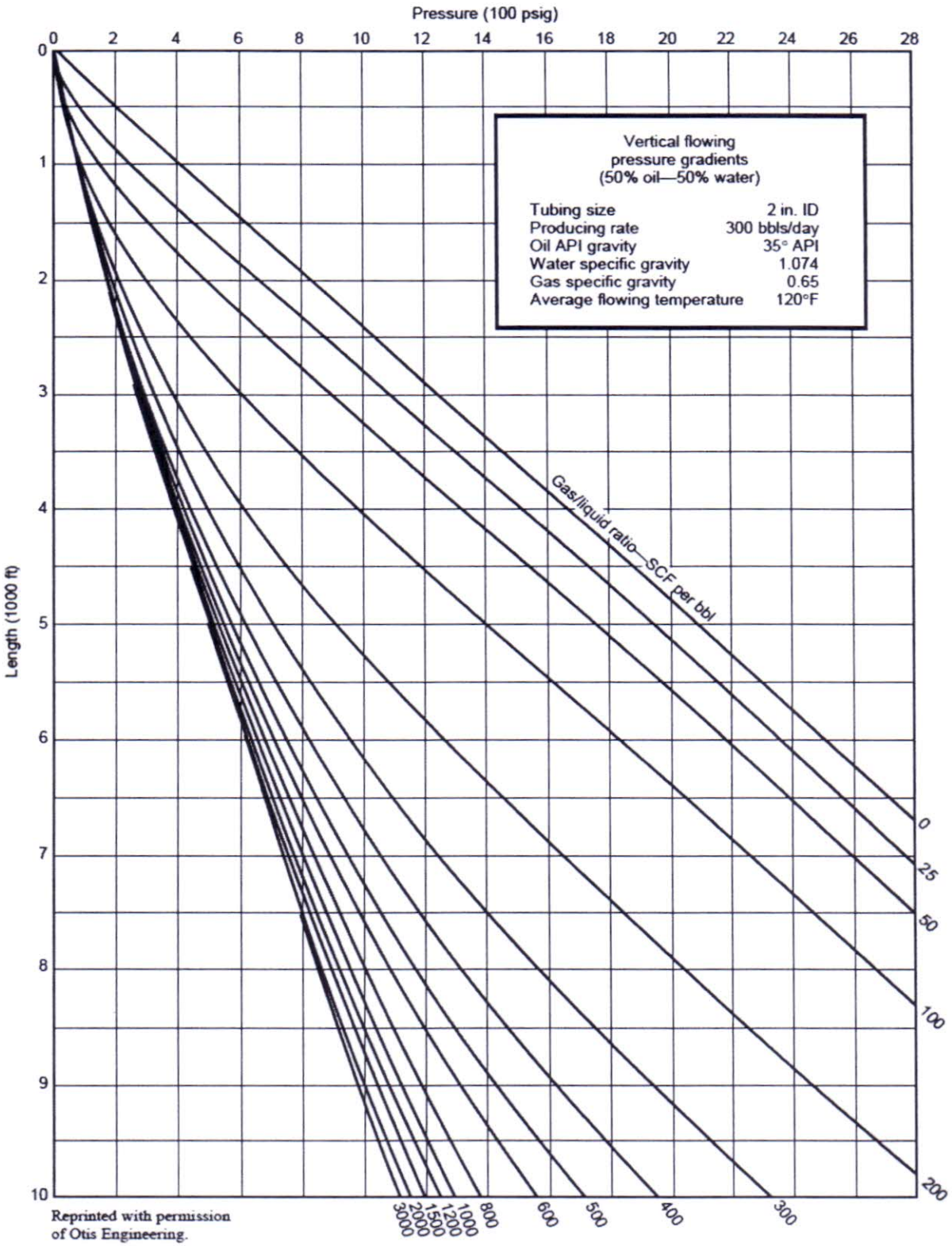
(8 Marks)

والله ولي التوفيق

TABLE 3.1A

Nitrogen Temperature Correction Factors for Temperature in Fahrenheit

°F	Ct	°F	Ct	°F	Ct	°F	Ct	°F	Ct	°F	°Ct
61	0.998	101	0.919	141	0.852	181	0.794	221	0.743	261	0.698
62	0.996	102	0.917	142	0.850	182	0.792	222	0.742	262	0.697
63	0.994	103	0.915	143	0.849	183	0.791	223	0.740	263	0.696
64	0.991	104	0.914	144	0.847	184	0.790	224	0.739	264	0.695
65	0.989	105	0.912	145	0.845	185	0.788	225	0.738	265	0.694
66	0.987	106	0.910	146	0.844	186	0.787	226	0.737	266	0.693
67	0.985	107	0.908	147	0.842	187	0.786	227	0.736	267	0.692
68	0.983	108	0.906	148	0.841	188	0.784	228	0.735	268	0.691
69	0.981	109	0.905	149	0.839	189	0.783	229	0.733	269	0.690
70	0.979	110	0.903	150	0.838	190	0.782	230	0.732	270	0.689
71	0.977	111	0.901	151	0.836	191	0.780	231	0.731	271	0.688
72	0.975	112	0.899	152	0.835	192	0.779	232	0.730	272	0.687
73	0.973	113	0.898	153	0.833	193	0.778	233	0.729	273	0.686
74	0.971	114	0.896	154	0.832	194	0.776	234	0.728	274	0.685
75	0.969	115	0.894	155	0.830	195	0.775	235	0.727	275	0.684
76	0.967	116	0.893	156	0.829	196	0.774	236	0.725	276	0.683
77	0.965	117	0.891	157	0.827	197	0.772	237	0.724	277	0.682
78	0.963	118	0.889	158	0.826	198	0.771	238	0.723	278	0.681
79	0.961	119	0.887	159	0.825	199	0.770	239	0.722	279	0.680
80	0.959	120	0.886	160	0.823	200	0.769	240	0.721	280	0.679
81	0.957	121	0.884	161	0.822	201	0.767	241	0.720	281	0.678
82	0.955	122	0.882	162	0.820	202	0.766	242	0.719	282	0.677
83	0.953	123	0.881	163	0.819	203	0.765	243	0.718	283	0.676
84	0.951	124	0.879	164	0.817	204	0.764	244	0.717	284	0.675
85	0.949	125	0.877	165	0.816	205	0.762	245	0.715	285	0.674
86	0.947	126	0.876	166	0.814	206	0.761	246	0.714	286	0.673
87	0.945	127	0.874	167	0.813	207	0.760	247	0.713	287	0.672
88	0.943	128	0.872	168	0.812	208	0.759	248	0.712	288	0.671
89	0.941	129	0.871	169	0.810	209	0.757	249	0.711	289	0.670
90	0.939	130	0.869	170	0.809	210	0.756	250	0.710	290	0.669
91	0.938	131	0.868	171	0.807	211	0.755	251	0.709	291	0.668
92	0.936	132	0.866	172	0.806	212	0.754	252	0.708	292	0.667
93	0.934	133	0.864	173	0.805	213	0.752	253	0.707	293	0.666
94	0.932	134	0.863	174	0.803	214	0.751	254	0.706	294	0.665
95	0.930	135	0.861	175	0.802	215	0.750	255	0.705	295	0.664
96	0.928	136	0.860	176	0.800	216	0.749	256	0.704	296	0.663
97	0.926	137	0.858	177	0.799	217	0.748	257	0.702	297	0.662
98	0.924	138	0.856	178	0.798	218	0.746	258	0.701	298	0.662
99	0.923	139	0.855	179	0.796	219	0.745	259	0.700	299	0.661
100	0.921	140	0.853	180	0.795	220	0.744	260	0.699	300	0.660



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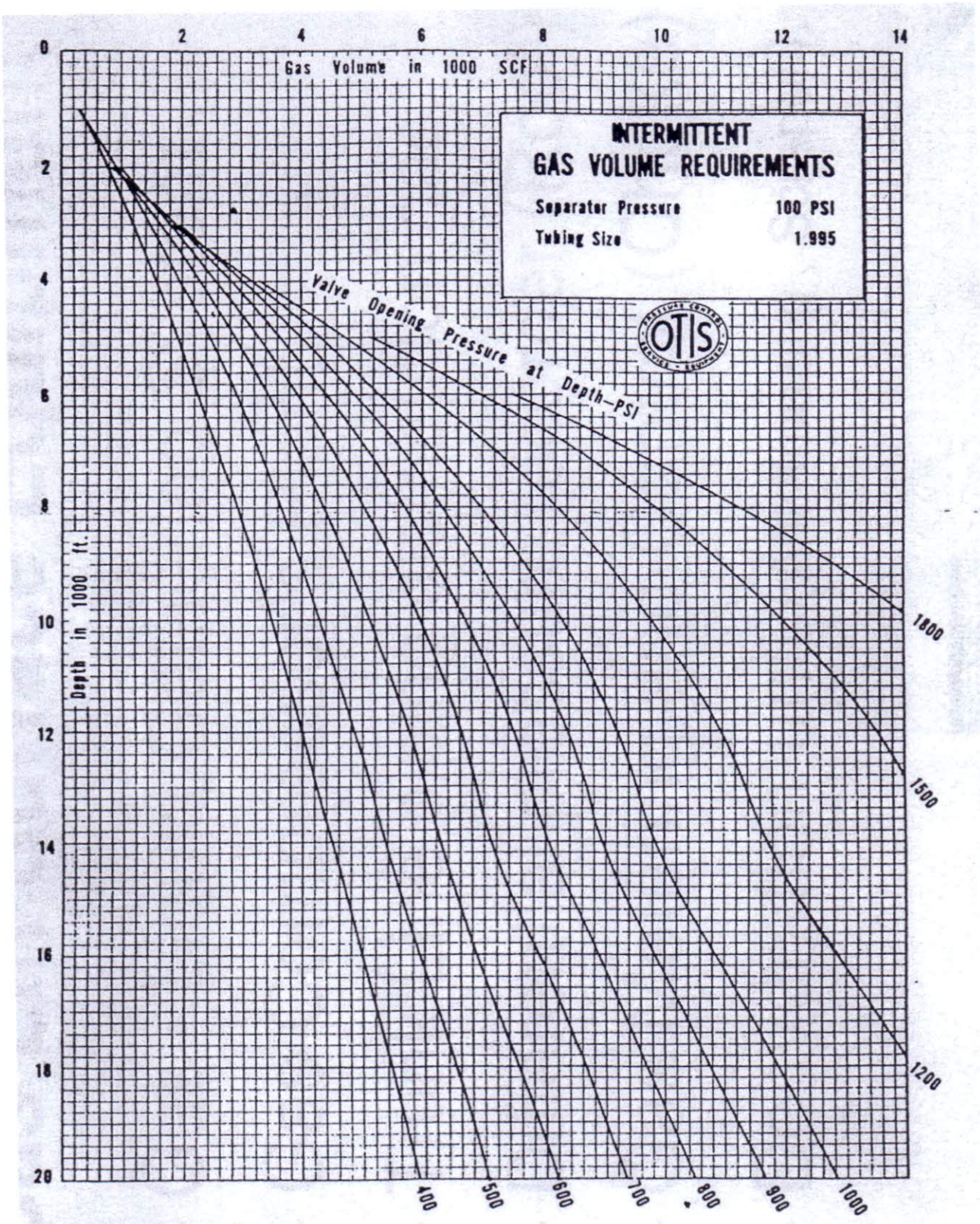
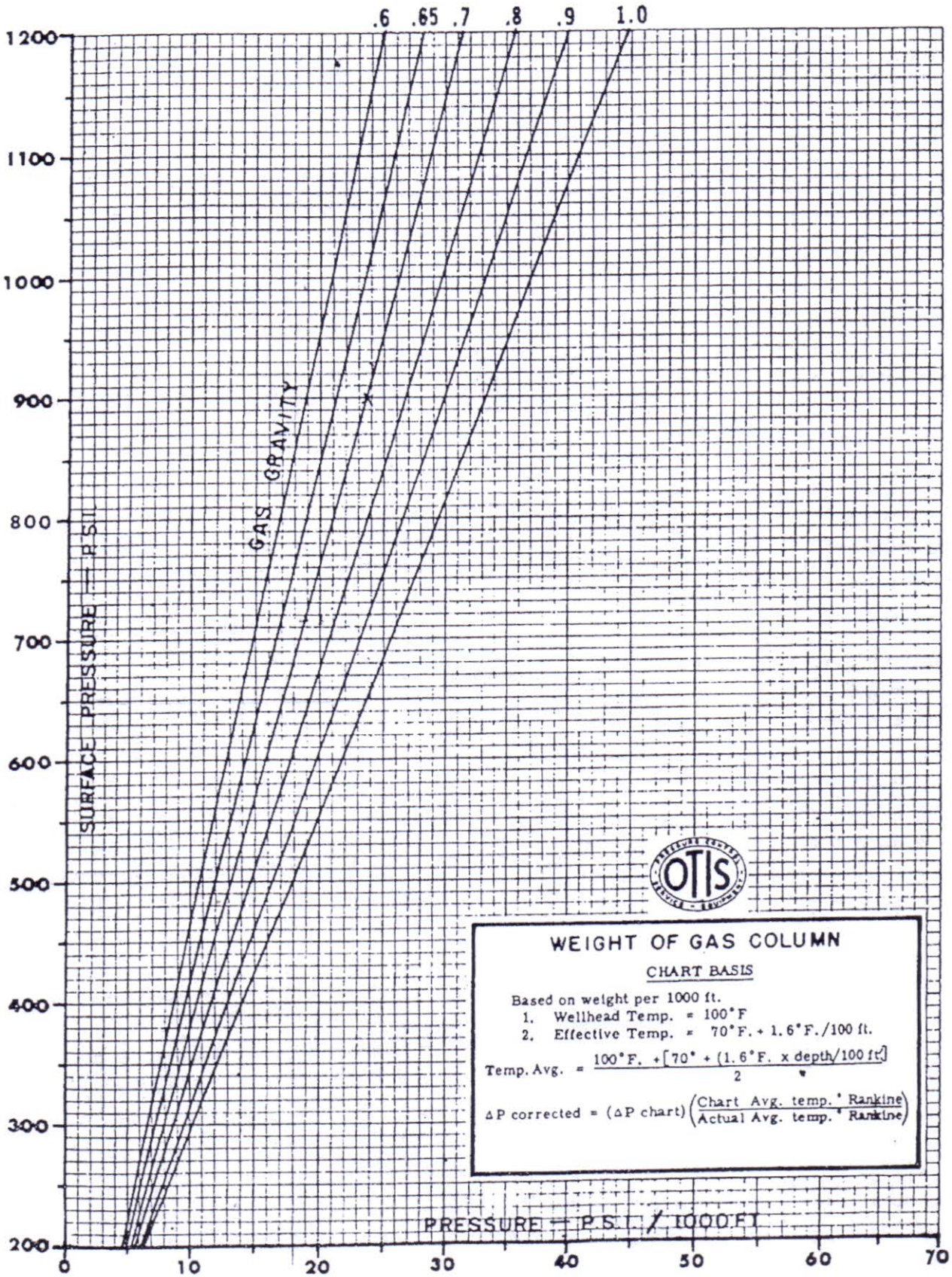


Fig. 3G-8 (Courtesy Otis Engineering Corp.)



g. 3A-1 *Weight of Gas Column (Courtesy Otis Engineering Corp.)*

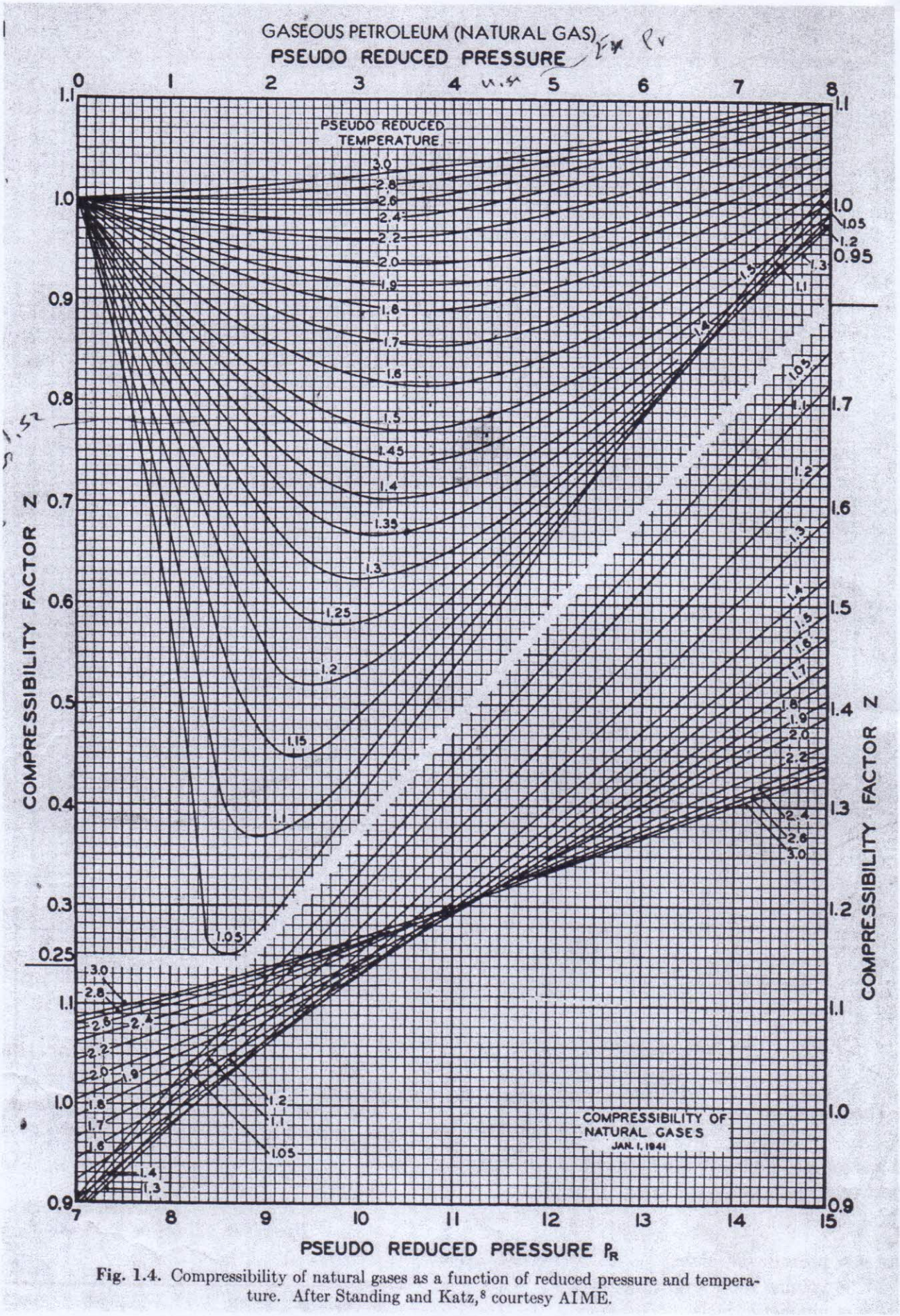


Fig. 1.4. Compressibility of natural gases as a function of reduced pressure and temperature. After Standing and Katz,[8] courtesy AIME.

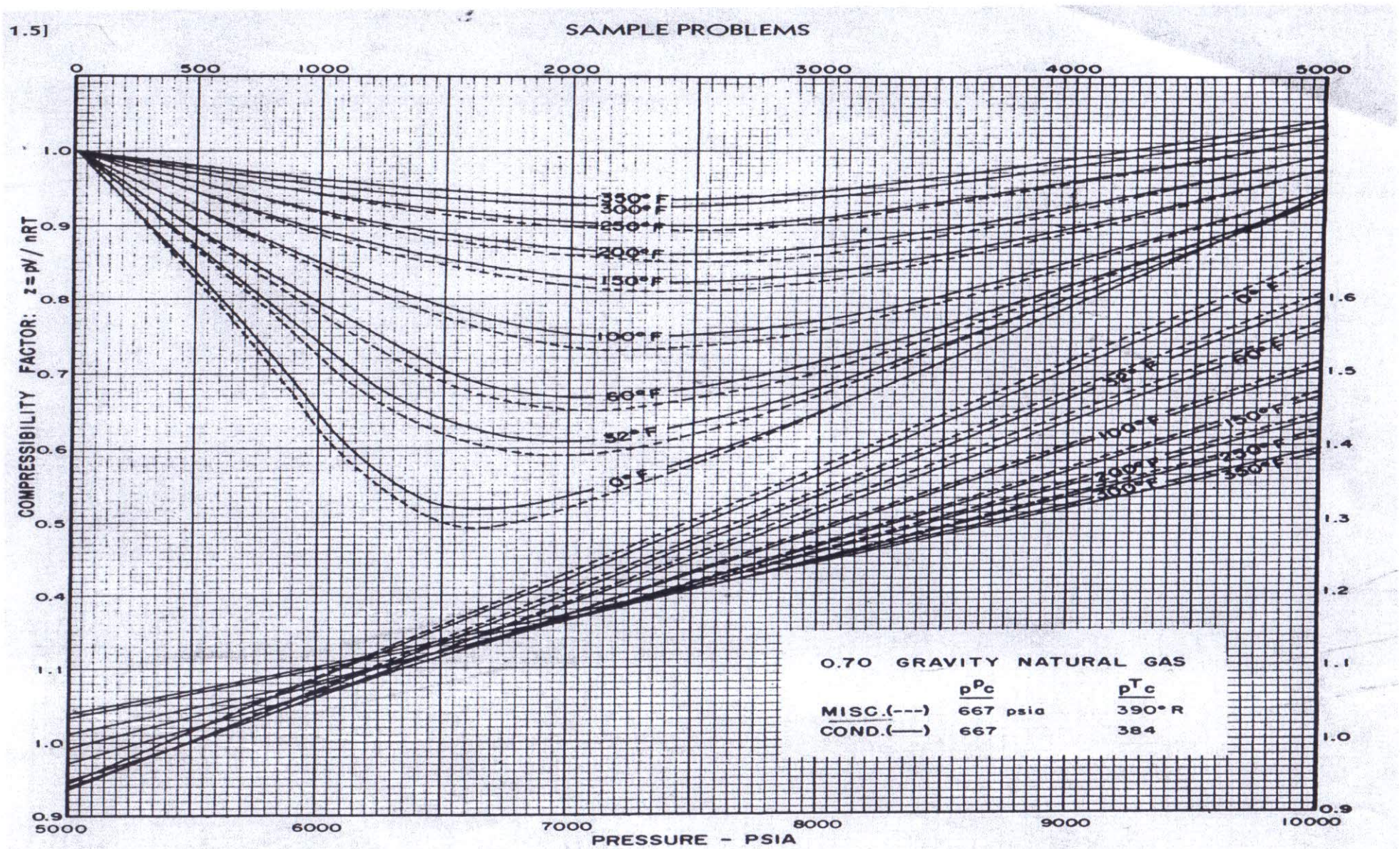
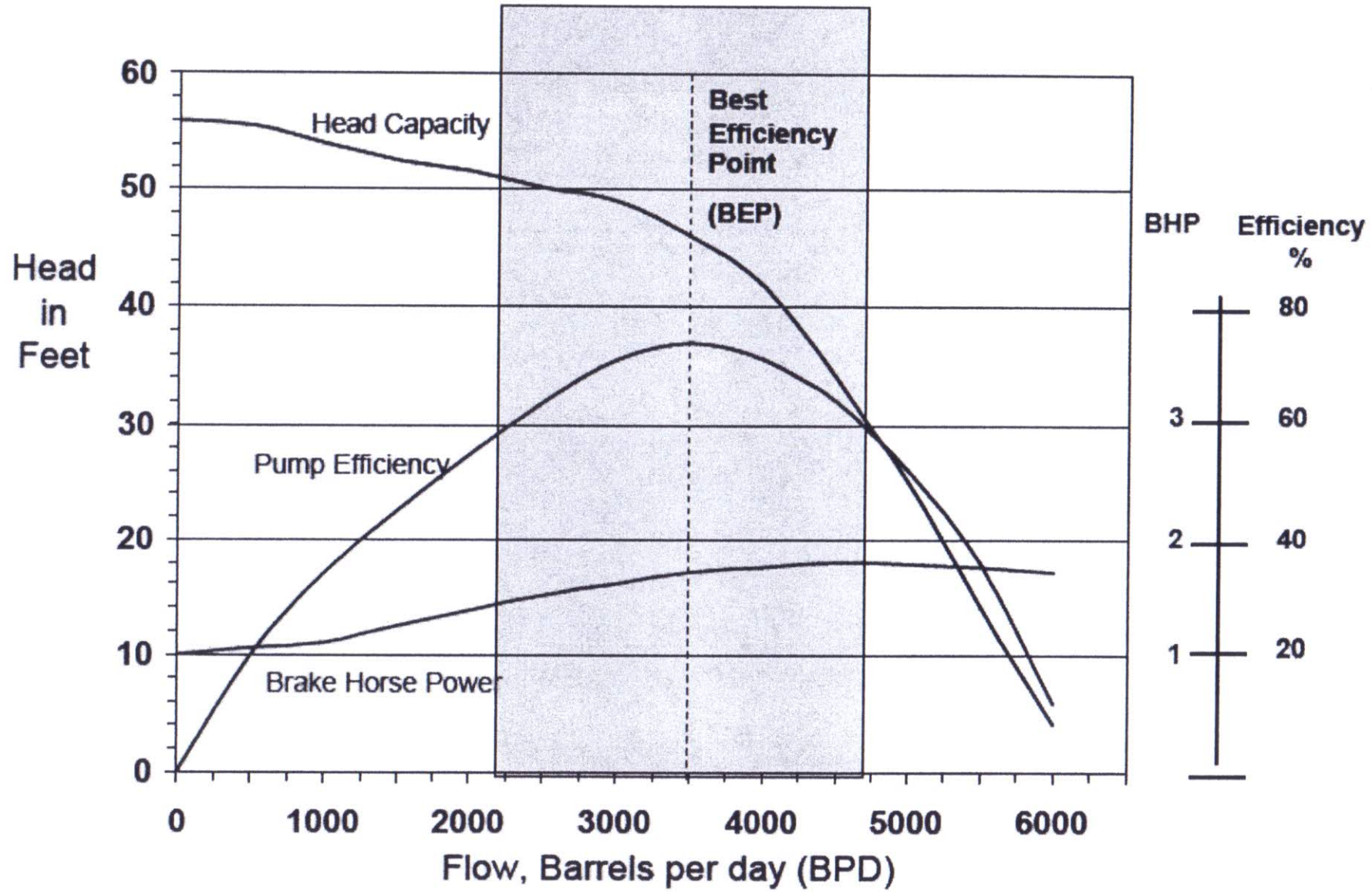


Fig. 1.9. 0.70 gravity natural gas.


Head Capacity
Best Efficiency Point (BEP)
Pump Efficiency
Brake Horse Power
Head in Feet
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
6000
Flow, Barrels per day (BPD)
BHP
Efficiency %
3
2
1
80
60
40
20

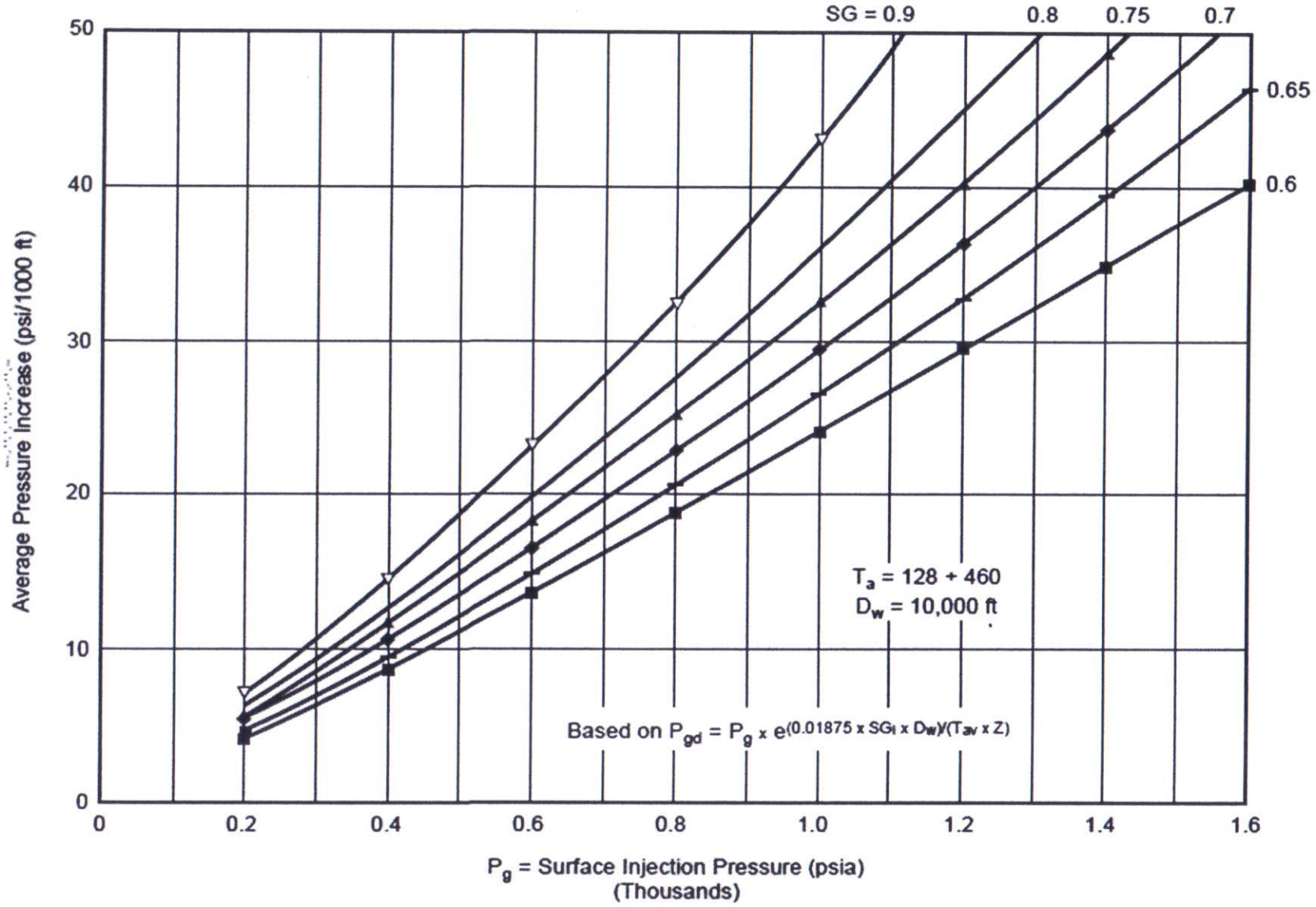


Figure 5—Weight of Injection Gas Column