TABLE 1. APPROXIMATE FULL LOAD EFFICIENCIES FOR NON-CONDENSING ENGINE AND MULTI-STAGE IMPULSE TURBO-GENERATORS—GEARED TYPE

RATED CAPACITY AT FULL LOAD KW	MECHANICAL EFFICIENCIES OF ENGINE UNITS	MECHANICAL EFFICIENCIES OF TURBINE UNITS	BRAKE POTENTIAL EFFICIENCY RATIO OF TURBINES	[a]FACTORS FOR CONVERTING IDEAL WATER RATES TO ACTUAL WATER RATES (FOR TURBINES ONLY)	GENERATOR EFFICIENCIES AT FULL LOAD
100	0.900	0.930	0.45	2.22	0.932
200	0.905	0.935	0.50	2.00	0.934
300	0.910	0.940	0.54	1.85	0.936
400	0.915	0.942	0.58	1.74	0.938
500	0.920	0.945	0.61	1.64	0.940
600	0.925	0.947	0.64	1.56	0.942
750	0.930	0.950	0.65	1.54	0.944
1000	0.935	0.952	0.67	1.49	0.945
1250	0.940	0.955	0.67	1.49	0.947
1500	0.945	0.957	0.67	1.49	0.950
2000	0.950	0.960	0.68	1.45	0.954
CONDENSING TURBINES					
500		0.950	0.68	1.45	0.940
600		0.952	0.69	1.44	0.942
750		0.954	0.70	1.43	0.944
1000		0.956	0.70	1.43	0.945
1250		0.958	0.70	1.43	0.947
1500		0.960	0.70	1.43	0.950
2000		0.960	0.70	1.43	0.954

	(FOR NON-CONDENSING ENGINES ONLY)
Single valve automatic engine units up to 400 kw	1.64
Four valve automatic engine units up to 400 kw	1.42
Unaflow engine units up to 400 kw	1.20

[a]These factors are for indicated engine or brake turbine loads and do not take into account the mechanical efficiency of engine units or generator efficiencies for either engine or turbine units; but do include the mechanical efficiency of turbines.

TABLE 2. FACTORS BY WHICH TO MULTIPLY ACTUAL WATER RATES AT FULL LOAD TO OBTAIN ESTIMATED WATER RATES AT FRACTIONAL LOADS ON NON-CONDENSING ENGINE AND TURBINE-DRIVEN ELECTRIC GENERATING UNITS[b]

SIZE AND KIND OF UNIT	LOAD			
	¼	½	¾	Full
Single valve engines up to 400 kw	1.32	1.09	1.03	1.00
Four valve engines up to 400 kw	1.30	1.08	1.03	1.00
Unaflow engines up to 400 kw	1.10	1.02	0.980	1.00
Geared turbines up to 600 kw	1.57	1.25	1.05	1.00
Geared turbines 600 to 2000 kw	1.50	1.20	1.04	1.00

[b]These values are for indicated or brake loads and do not take into account variations in generator efficiencies under various load conditions. Generator efficiencies vary from 85 per cent at one quarter load to 95 per cent at full load.

Since 2546 Btu per hour = one horsepower-hour and 3415 Btu per hour = one kilowatt-hour the heat extracted in performing work per pound of steam used may be obtained by dividing these figures by the water rates of the units per indicated horsepower hour or per kilowatt hour, respectively, of work done by the steam. From 1 per cent to 2 per cent may be deducted for radiation and other heat losses, depending upon the size of unit.

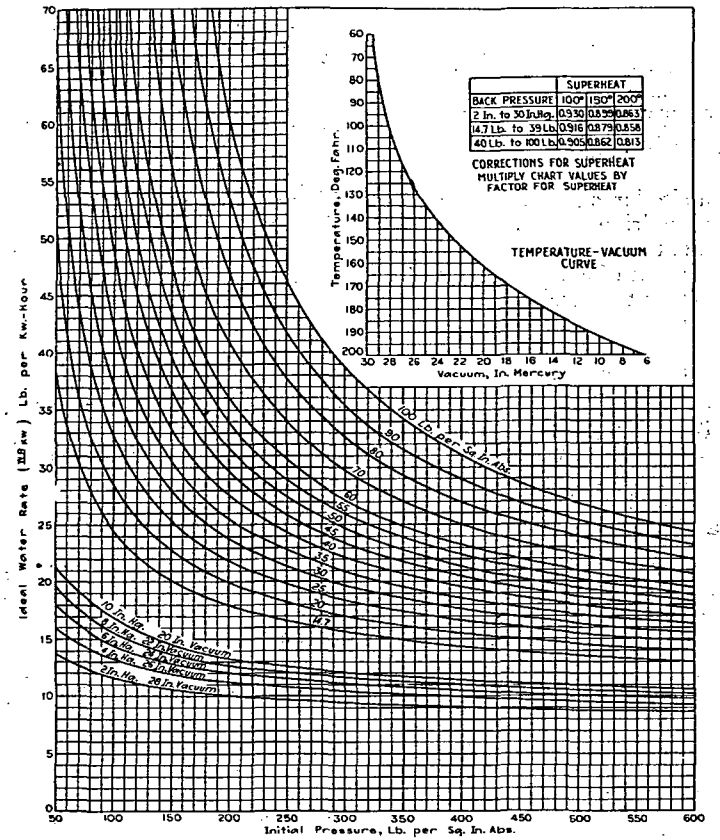

FIG. 4. IDEAL WATER RATE PER KILOWATT HOUR WITH DRY SATURATED STEAM FOR VARIOUS INITIAL PRESSURES AND BACK PRESSURES[ab]

[a]For ideal water rate per indicated horsepower hour, divide these values by 1.34.
[b]From Power from Process and Space Heating Steam, by L. A. Harding (A.S.H.V.E. TRANSACTIONS, Vol. 36, 1930).

Example 1. A 200-kw turbine is operating on saturated steam at 150 lb gage pressure and consuming 40 lb of steam per kilowatt hour delivered, at full load. Determine the heat available in the exhaust for heating.