

the quotient should be divided by 30, which will give the horse power according to the American standard. The following is an example of this method of finding the horse power:

Total quantity of water evaporated = 2,000 lbs.

Steam pressure (by gauge) 60 lbs.

Temperature of feed water before entering pump, 40°

Total heat of 1 lb. of steam at 60 lbs. pressure = 1175.710 B.T.U.

Total heat of 1 lb. of feed water at 40° = 8 B.T.U.

$1174.710 - 8 \times 2,000 \div 1110.343 = 210.33 \div 30 = 7.0$ H. P.

Example of finding the equivalent evaporation from and at 212°.

Water evaporated per lb. of fuel, 10 lbs.

Average pressure by gauge 60 lbs.

" temperature of feed water, 40°

Total heat of one lb. of steam at 60 lbs. pressure,

1175.710 heat units.

Total heat of one lb. of feed water at 40°, 8. heat units.

Example. $10 \times 1175.710 - 8 \div 966 = 12.08$ lbs.

In comparing fuels as well as in comparing the efficiency of boilers, the quantity of water evaporated per pound of fuel from and at 212° should always be used. The actual quantity of water evaporated per pound of fuel will differ with variations of temperature of the feed water entering the boiler, and also with the steam pressure or temperature at which the steam leaves the boiler, but the quantity evaporated per pound of fuel from and at 212° allows for these variations and gives a true comparison of the value of fuel if the efficiency of the generator is constant, or of the efficiency of the generator if the calorific value of the fuel is known. The temperature of saturated or dry steam always corresponds with the pressure, but if from any cause the steam be not dry, it will carry away less heat in proportion to weight, or, if the steam be superheated by contact of the products of combustion with the steam surface of the boiler, it will carry away more heat. In either case the result of the test will be vitiated unless the quality of the steam be ascertained and accounted for. This is usually done by means of a calorimeter, one of the best of which, known as the "Barrus Calorimeter," was designed by Mr. Geo. H. Barrus, of Boston. No attempt has been made to ascertain or account for the quality of steam in the simple test given, because it would complicate the work; it is intended that a professional test of the boiler should include this important item, and, if the boiler is found to be abnormal in this respect, the expert should either give directions for the removal of the cause, or provide a formula for the correction of the error due to wet or superheated steam in future tests.

The following table will be found useful in ascertaining the equivalent rates of evaporation, horse power, etc. :-

STEAM TABLE.			FEED WATER.		
Pressure of steam by gauge.	Temperature.	Total heat of evaporation above 30° in heat units.	Temperature of feed water.	Total heat above 32° in heat units.	
40	286.9	1169.460	32	8.06	18.1
45	292.5	1171.176	40	18.1	28.1
50	297.8	1172.779	50	28.1	38.1
55	302.7	1174.286	60	38.1	48.1
60	307.4	1175.710	70	48.1	58.1
65	311.8	1177.060	80	58.1	68.1
70	316.	1178.343	90	68.1	78.1
75	320.	1179.569	100	78.1	88.1
80	323.9	1180.741	110	88.1	98.1
85	327.6	1181.866	120	98.1	108.2
90	331.1	1182.945	130	108.2	118.3
95	334.5	1183.986	140	118.3	128.4
100	337.8	1184.992	150	128.4	138.5
105	341.	1185.961	160	138.5	148.5
110	344.1	1186.899	170	148.5	158.6
115	347.1	1187.809	180	158.6	168.7
120	350.	1188.695	190		
125	352.8	1189.555	200		

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