TABLE 4. UNIT FUEL CONSUMPTION CONSTANTS (U) FOR GAS[a]
Based on 0 F Outside Temperature, 70 F Inside Temperature

HEATING VALUE OF GAS BTU PER CU FT	HOT WATER			STEAM			WARM AIR	
	Cu Ft Gas per Degree-Day per Sq Ft EDR			Cu Ft Gas per Degree-Day per Sq Ft EDR			Cu Ft Gas per Degree-Day per 1000 Btu Hourly Design Heat Loss	
	Up to 500 Sq Ft	500 to 1200 Sq Ft	Over 1200 Sq Ft	Up to 300 Sq Ft	300 to 700 Sq Ft	Over 700 Sq Ft	Gravity	Fan Systems
500	0.149	0.142	0.134	0.254	0.242	0.231	0.896	0.861
535	0.139	0.132	0.126	0.237	0.226	0.216	0.840	0.805
800	0.094	0.087	0.085	0.159	0.151	0.144	0.560	0.538
1000	0.075	0.071	0.068	0.127	0.121	0.116	0.449	0.431
1 Therm = 100,000 Btu	Gas Consumption in Therms per Degree-Day							
	0.000743	0.000709	0.000675	0.00127	0.00121	0.00116	0.00450	0.00430

[a] Abstracted from Comfort Heating, *American Gas Association*, 1938 and 5 percent added for operation without night reduction of temperature.

heating plants. They are based on an inside design temperature of 70 F and an outside design temperature of 0 F, and apply only to these conditions. For other outside design conditions corrections must be made by applying factors given in Table 3.

The factors in Table 4, as corrected if necessary, are satisfactory for regions having 3500 to 6500 degree-days per heating season. In regions with less than 3500 degree-days the unit gas consumption is higher than given; where over 6500, the unit is less than given. Ten percent addition or deduction in these cases is recommended by *A.G.A.* publications. This table cannot be used for making estimates for industrial buildings where low inside temperatures are maintained.

For gas heat values other than those given in Table 4, simply interpolate or extrapolate. It will also be noted that Table 4 applies only to small installations. In general, the larger the installation, the smaller the unit gas consumption becomes, and the values in the table should be used with care, if at all, in large gas-burning installations.

Example 4: Estimate the gas required to heat a building located in Chicago, Ill., where the heating season has 6310 degree-days and the gas heating value is 800 Btu per cu ft. The calculated heating requirements are 1000 sq ft of hot water radiation based on design temperature of −10 F and 70 F.

TABLE 5. UNIT FUEL CONSUMPTION[a] CONSTANTS (U) FOR OIL[b]
Based on 0 F Outside Temperature, 70 F Inside Temperature

UNIT[c]	EFFICIENCY IN PERCENT	
	70	80
Gal Oil per Sq Ft Steam Radiator	0.00105	0.00092
Gal Oil per Sq Ft Hot Water Radiator	0.00066	0.00058
Gal Oil per 1000 Btu per Hour Heat Loss	0.00437	0.00383

[a] Based on a heating value of 141,000 Btu per gallon.
[b] Abstracted by permission from *Degree-Day Handbook* (Second Edition, 1937), by C. Strock and C. H. B. Hotchkiss. Seven percent added for operation without night reduction of temperature and change to heating value of 141,000 Btu per gallon.
[c] Per degree day.

Solution: From Table 4, the fuel consumption for a design temperature of 0 F with 800 Btu gas is found to be 0.087 cu ft of gas per (degree-day) (square foot of hot water radiation). From Table 3, the correction factor is 0.875 for −10 F outside design temperature, hence, 0.875 × 0.087 = 0.076. By Equation 4,

$$F = 0.076 \times 1000 \times 6310 = 480{,}000 \text{ cu ft.}$$

Estimating Oil Consumption

Table 5 gives unit fuel consumption factors for oil, similar to those given for gas in Table 4.

The factors in Table 5 apply only to an inside design temperature of 70 F and an outside design temperature of 0 F. For other outside design temperatures, the constants in Table 5 must be multiplied by the values in Table 3 as explained under Estimating Gas Consumption.

Values given in Table 5 assume the use of oil with a heating value of 141,000 Btu per gallon. For other heating values, multiply the values in Table 5 by the ratio of 141,000 divided by the heating value per gallon of fuel being used.

Example 5: Estimate the seasonal oil consumption of a boiler, designed for oil firing, in a building located in Toledo, Ohio. The building has a calculated heat loss of 240,000 Btu per hr. The oil heat value is 144,000 Btu per gal, and the assumed seasonal efficiency is 80. The outside design temperature for Toledo is −10 F, and the inside design temperature is 70 F.

Solution: From Table 5, under 80 percent efficiency and in the bottom line, the value of U is found to be 0.00383 gal per 1000 Btu hourly heat loss for 0 F outside temperature. The correction factor for −10 F outside design temperature from Table 3 is 0.875. Solving 0.875 × 0.00383 = 0.00335. Making a further correction for the heating value,

$$0.00335 \times \frac{141{,}000}{144{,}000} = 0.00328 \text{ gal per 1000 Btu per hr calculated heat loss per degree-day.}$$

From Table 2, the total normal degree-days for Toledo are 6394. Since U is expressed in 1000 Btu, N is equal to 240. Substituting in Equation 4

$$F = 0.00328 \times 6394 \times 240 = 5030 \text{ gal.}$$

Estimating Coal or Coke Consumption

Coal or coke consumption estimates are made by following exactly the same procedure as for oil. Values of U are given in Table 6 which only apply to an inside design temperature of 70 F and an outside design temperature of 0 F. A correction must be made for other conditions by use of the multiplying factors in Table 3. Data in Table 6 are based on 12,000

TABLE 6. UNIT FUEL CONSUMPTION[a] CONSTANTS (U) FOR COAL[b]
Based on 0 F Outside Temperature, 70 F Inside Temperature

UNIT[c]	EFFICIENCY IN PERCENT				
	40	50	60	70	80
Lb Coal per Sq Ft Steam Radiator	0.0216	0.0172	0.0143	0.0123	0.0108
Lb Coal per Sq Ft Hot Water Radiator	0.0135	0.0108	0.0091	0.0078	0.0068
Lb Coal per 1000 Btu per Hour Heat Loss	0.0889	0.0717	0.0592	0.0507	0.0444

[a] Based on a heating value of 12,000 Btu per pound.
[b] Abstracted by permission from *Degree-Day Handbook* (Second Edition, 1937), by C. Strock and C. H. B. Hotchkiss. Eight percent added for operation without night reduction of temperature.
[c] Per degree-day.