into three general classes of equipment or devices: (1) electrical appliances, (2) gas appliances, and (3) steam heating appliances.

In the first group may be found such devices as lights[11], fans, motors, toasters, waffle irons, etc. The wattages are usually marked on the nameplates and it is only necessary to multiply the aggregate wattage by 3.413 (Btu per watthour) in order to estimate the heat added to the conditioned space by such devices in Btu per hour.

Electric motors are usually rated in units of horsepower *output*. To determine the corresponding input, which is the rate at which heat is added to the conditioned space by full-load operation of such motors, some idea of motor efficiency is necessary. The aggregate input in horsepower should then be multiplied by 2546 (Btu per horsepower hour). When motor efficiencies are not known, the data in Table 9 may be used.

TABLE 9. HEAT GENERATED BY MOTORS

Name-plate Rating Horsepower	Heat Gain in Btu per Hour per Horsepower	
	Connected Load in Same Room	Connected Load Outside of Room
⅛ to ½	4250	1700
½ to 3	3700	1150
3 to 20	2950	400

In the second group belong such appliances as coffee urns, gas ranges, steam tables, broilers, hot plates, etc. For heat generating capacities of such appliances refer to Table 10.

Considerable judgment must be followed in the use of data given in Table 10. Consideration must be given to time of day when appliances are used and the heat they contribute at time of peak load. Only those appliances in use at the time of the peak load need be considered. Consideration must also be given to the way appliances are installed, whether products of combustion are vented to a flue, whether they escape into the space to be conditioned, or whether appliances are hooded allowing part of the heat to escape through a stack. There are no generally accepted data available on the effects of venting and shielding heating appliances but it is believed that, when they are properly hooded with a positive fan exhaust system through the hood, 50 per cent of the heat will be carried away and 50 per cent dissipated in the space to be conditioned. Where latent as well as sensible heat is given off, it is usually safe to assume that all latent heat will be removed by a properly designed and operated vent or hood.

Moisture Through Walls

In some applications walls of the conditioned space may be in contact with other spaces which have in them a higher water vapor pressure than that in the conditioned space. It is known that water vapor will flow

[11]Cooler Footcandles for Air Conditioning, by W. G. Darley (A.S.H.V.E. TRANSACTIONS, Vol. 46, 1940, p. 367). Lighting and Air Conditioning Design Factors, Report of *I. E. S.*—A.S.H.V.E. Joint Committee on Lighting in Air Conditioning (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, September, 1941, p. 605). Lighting and Air Conditioning, by Howard M. Sharp (*Heating and Ventilating*, November, 1942, p. 35).

TABLE 10. HEAT GAIN FROM VARIOUS SOURCES[a]

Source	Per Cent Name-plate Rating	Percentage or Btu per Hour		
		Sensible	Latent	Total
Electric Heating Equipment				
1. Electric Oven-Baking		80%	20%	100%
2. Baker's Oven	70	80%	20%	100%
3. Coffee Urn—per Gallon Capacity	—	1025	1025	2050
4. Glass Coffee Maker—per Section	20	90%	10%	100%
5. Warming Receptacle	30	80%	20%	100%
6. Plate Warmer	50	100%	0%	100%
7. Hot Plates	80			
8. Steam Table—Water Bath Type	100	65%	35%	100%
9. Frying Griddles	75	90%	10%	100%
10. Fry Kettle	70			
11. Waffle Baker	40	75%	25%	100%
12. Sandwich Grille	60	90%	10%	100%
13. Toaster—Intermittent or Timed Control	50	90%	10%	100%
14. Toaster—Continuous	100	90%	10%	100%
15. Hair Dryer in Beauty Parlor—600 w	—	2050	—	2050
16. Permanent Wave Machine in Beauty Parlor—24-25 w Units	—	2050	—	2050
Gas Burning Equipment[b]				
17. Gas Heated Oven—Baking—*no vent connection*	70	72%	28%	100%
17. Gas Heated Oven—Baking—*gravity vent connection*	35	100%	0%	100%
18. Open Top Burner—per Hole	50	45%	55%	100%
19. Hot or Closed Top—per Burner—*no vent connection*	100	45%	55%	100%
19. Hot or Closed Top—per Burner—*gravity vent connection*	70	50%	50%	100%
20. Coffee Urn—Large 18 in. Diam.—Single Drum	—	5000	5000	10,000
21. Coffee Urn—Small 12 in. Diam.—Single Drum	—	3000	3000	6000
22. Coffee Urn—per Gallon of Rated Capacity	—	500	500	1000
23. Plate Warmer—*no vent connection*	60	90%	10%	100%
23. Plate Warmer—*gravity vent connection*	10	100%	0%	100%
24. Steam Table—Water Bath Type—*no vent connection*	60	55%	45%	100%
24. Steam Table—Water Bath Type—*gravity vent connection*	42	50%	50%	100%
25. Frying Griddles—*no vent connection*	75	81%	19%	100%
25. Frying Griddles—*gravity vent connection*	52	90%	10%	100%
26. Fry Kettle—*no vent connection*	70	72%	28%	100%
26. Fry Kettle—*gravity vent connection*	49	80%	20%	100%
27. Egg Boiler—per Egg Compartment	—	2500	2500	5000
28. Cigar Lighter—Continuous Flame Type	—	2250	250	2500
29. Curling Iron Heater	—	2250	250	2500
30. Pilot Light	—	180	20	200
Steam Heated Equipment[c]				
31. Steam Heated Surface Not Polished—per Square Foot of Surface	—	330	0	330
32. Steam Heated Surface Polished—per Square Foot of Surface	—	130	0	130
33. Insulated Surface—per Square Foot	—	80	0	80
34. Bare Pipes, Not Polished—per Square Foot of Surface	—	400	0	400
35. Bare Pipes, Polished—per Square Foot of Surface	—	220	0	220
36. Insulated Pipes—per Square Foot	—	110	0	110
37. Coffee Urn—Large, 18 in. Diam.—Single Drum	—	2000	2000	4000
38. Coffee Urn—Small, 12 in. Diam.—Single Drum	—	1200	1200	2400
39. Egg Boiler—per Egg Compartment	—	2500	2500	5000
40. Steam Table—per Square Foot of Top Surface	—	300	800	1100
Miscellaneous				
41. Heat Liberated By Food per Person, as in a Restaurant	—	30	30	60
42. Heat Liberated from Hot Water used direct and on towels per hour—Barber Shops	—	100	200	300

[a]Heat gain from electric or gas residential ranges or cooking stoves depends on size of the family, socio-economic status of the individual, time of day for principal meal, and whether the equipment is manually or automatically controlled. Total heat gain will probably not exceed 40 per cent name-plate rating. Per cent sensible and latent heat will depend upon use of equipment; dry heat; baking or boiling.

[b]Name-plate ratings of gas burning equipment can be obtained from a Directory of Approved Gas Appliances and Listed Accessories, January 1, 1942, obtainable from *American Gas Association* Laboratories, Cleveland, Ohio.

[c]Steam Requirements of Process Equipment, Report of the Commercial Relations Committee, *National District Heating Association* (*Heating, Piping and Air Conditioning*, November, 1942, p. 675).