

# **Appliance/Equipment Rules of Thumb**

### **13.01 Offices and Commercial Spaces**

**A. Total Appliance/Equipment Heat Gain: 0.5–5.0 Watts/Sq.Ft.**

**B. Computer equipment loads for office spaces range between 0.5 Watt/Sq.Ft. and 2.5 Watts/Sq.Ft. (recommend 1.5 Watts/Sq.Ft.). If actual computer equipment loads are available, they should be used in lieu of values listed here.**

### **13.02 Computer Rooms, Data Centers, and Internet Host Facilities**

2.0–300.0 Watts/Sq.Ft.

### **13.03 Telecommunication Rooms**

50.0–120.0 Watts/Sq.Ft.

### **13.04 Electrical Equipment Heat Gain**

#### **A. Transformers:**

- |                         |              |
|-------------------------|--------------|
| 1. 150 KVA and Smaller  | 50 Watts/KVA |
| 2. 151–500 KVA          | 30 Watts/KVA |
| 3. 501–1000 KVA         | 25 Watts/KVA |
| 4. 1001–2500 KVA        | 20 Watts/KVA |
| 5. Larger than 2500 KVA | 15 Watts/KVA |

#### **B. Switchgear:**

- |  |             |
|--|-------------|
| 1. Low Voltage Breaker 0–40 Amps             | 10 Watts    |
| 2. Low Voltage Breaker 50–100 Amps           | 20 Watts    |
| 3. Low Voltage Breaker 225 Amps              | 60 Watts    |
| 4. Low Voltage Breaker 400 Amps              | 100 Watts   |
| 5. Low Voltage Breaker 600 Amps              | 130 Watts   |
| 6. Low Voltage Breaker 800 Amps              | 170 Watts   |
| 7. Low Voltage Breaker 1,600 Amps            | 460 Watts   |
| 8. Low Voltage Breaker 2,000 Amps            | 600 Watts   |
| 9. Low Voltage Breaker 3,000 Amps            | 1,100 Watts |
| 10. Low Voltage Breaker 4,000 Amps           | 1,500 Watts |
| 11. Medium Voltage Breaker/Switch 600 Amps   | 1,000 Watts |
| 12. Medium Voltage Breaker/Switch 1,200 Amps | 1,500 Watts |
| 13. Medium Voltage Breaker/Switch 2,000 Amps | 2,000 Watts |
| 14. Medium Voltage Breaker/Switch 2,500 Amps | 2,500 Watts |

#### **C. Panelboards:**

- 2 Watts per circuit

#### **D. Motor Control Centers**

- 500 Watts per section—each section is approximately 20" wide × 20" deep × 84" high.

#### **E. Starters:**

- |                                 |          |
|---------------------------------|----------|
| 1. Low Voltage Starters Size 00 | 50 Watts |
| 2. Low Voltage Starters Size 0  | 50 Watts |

3. Low Voltage Starters Size 1	50 Watts
4. Low Voltage Starters Size 2	100 Watts
5. Low Voltage Starters Size 3	130 Watts
6. Low Voltage Starters Size 4	200 Watts
7. Low Voltage Starters Size 5	300 Watts
8. Low Voltage Starters Size 6	650 Watts
9. Medium Voltage Starters Size 200 Amp	400 Watts
10. Medium Voltage Starters Size 400 Amp	1,300 Watts
11. Medium Voltage Starters Size 700 Amp	1,700 Watts

**F. Variable Frequency Drives:**

1. 2 to 6 percent of the KVA rating

**G. Miscellaneous Equipment:**

1. Bus Duct 0.015 Watts/Ft/Amp
2. Capacitors 2 Watts/KVAR

**Notes:**

1. Actual electrical equipment heat gain values will vary from one manufacturer to another—use actual values when available.
2. Generally, electrical equipment rooms only require ventilation to keep equipment from overheating. Most electrical rooms are designed for 95°F. to 104°F.; however, consult electrical engineer for equipment temperature tolerances. If space temperatures below 90°F. are required by equipment, air conditioning of space will be required.
3. If outside air is used to ventilate the electrical room, the electrical room design temperature will be 10°F. to 15°F. above outside summer design temperatures.
4. If conditioned air from an adjacent space is used to ventilate the electrical room, the electrical room temperature can be 10°F. to 20°F. above the adjacent spaces.

## **13.05 Motor Heat Gain**

**A. Motors Only:**

1. Motors 0 to 2 Hp	190 Watts/Hp
2. Motors 3–20 Hp	110 Watts/Hp
3. Motors 25–200 Hp	75 Watts/Hp
4. Motors 250 Hp and Larger	60 Watts/Hp

**B. Motors and Driven Equipment are shown in the following table:**

MOTOR HORSEPOWER	LOCATION OF MOTOR AND DRIVEN EQUIPMENT WITH RESPECT TO CONDITIONED SPACE OR AIRSTREAM		
	MOTOR IN, DRIVEN EQUIPMENT IN BTU/HR	MOTOR OUT, DRIVEN EQUIPMENT IN BTU/HR	MOTOR IN, DRIVEN EQUIPMENT OUT BTU/HR
1/20	360	130	240
1/12	580	200	380
1/8	900	320	590
1/6	1,160	400	760
1/4	1,180	640	540
1/3	1,500	840	660
1/2	2,120	1,270	850
3/4	2,650	1,900	740
1	3,390	2,550	850
1-1/2	4,960	3,820	1,140
2	6,440	5,090	1,350
3	9,430	7,640	1,790
5	15,500	12,700	2,790
7-1/2	22,700	19,100	3,640
10	29,900	24,500	4,490
15	44,400	38,200	6,210
20	58,500	50,900	7,610
25	72,300	63,600	8,680
30	85,700	76,300	9,440
40	114,000	102,000	12,600
50	143,000	127,000	15,700
60	172,000	153,000	18,900
75	212,000	191,000	21,200
100	283,000	255,000	28,300
125	353,000	318,000	35,300
150	420,000	382,000	37,800
200	569,000	509,000	50,300
250	699,000	636,000	62,900

**13.06 Miscellaneous Guidelines**

- Actual equipment layouts and information should be used for calculating equipment loads.
- Movie projectors, slide projectors, overhead projectors, and similar types of equipment can generally be ignored because lights are off when being used and lighting load will normally be larger than this equipment heat gain.
- Items such as coffee pots, microwave ovens, refrigerators, food warmers, etc., should be considered when calculating equipment loads.
- Kitchen, laboratory, hospital, computer room, and process equipment should be obtained from owner, architect, engineer, or consultant due to extreme variability of equipment loads.