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466 Sound power and sound pressure level estimation

burner noise level is obtained by combining the levels in each octave band for fuel gas noise and air flow noise.

Combustion noise is generally not as significant as that produced by air and gas flow, and may be estimated using:

$$W_a = 1300 \eta \dot{m} H \quad (\text{W}) \quad (11.74)$$

where W_a is the overall acoustical power (W), η is the acoustical efficiency (of the order of 10^{-6}), \dot{m} is the flow rate (kg s^{-1}), and H (MKS calories kg^{-1}) is the heating value of the fuel. The maximum noise level occurs in the 500 Hz octave band and is 3 dB below the overall level. Above and below the 500 Hz band, the noise level is reduced at the rate of 6 dB per octave.

11.14 ELECTRICAL MOTOR NOISE

11.14.1 Small electric motors (below 300 kW)

The overall sound pressure at 1 m generated by small electric motors can be estimated, for totally enclosed, fan cooled (TEFC) motors, using the following equations (Army, Air Force and Navy, USA, 1983a):

Under 40 kW:

$$L_p = 17 + 17 \log_{10} kW + 15 \log_{10} RPM \quad (\text{dB re } 20 \mu\text{Pa}) \quad (11.75)$$

Over 40 kW:

$$L_p = 28 + 10 \log_{10} kW + 15 \log_{10} RPM \quad (\text{dB re } 20 \mu\text{Pa}) \quad (11.76)$$

Drip-proof (DRPR) motors produce 5 dB less sound pressure level than TEFC motors. The octave band sound pressure levels may be obtained for both types of motor by subtracting the values in Table 11.23 from the overall levels.

Table 11.23 Octave band level adjustments (dB) for small electric motors

Octave band center frequency (Hz)	Totally enclosed, fan cooled (TEFC) motor	Drip proof (DRPR) motor
31.5	14	9
63	14	9
125	11	7
250	9	7
500	6	6
1000	6	9
2000	7	12
4000	12	18
8000	20	27

(From Army, Air Force and Navy, USA, 1983a.)