## 3.4 Variable Frequency Drive (VFD) Improvements

The following protocol for the measurement of energy and demand savings applies to the installation of Variable Frequency Drives (VFDs) in standard commercial building applications shown in Table 3‑17. The baseline condition is a motor without a VFD control. The efficient condition is a motor with a VFD control.

### 3.4.1 Algorithms

ΔkWh = HP X LF / ηmotor X RHRSbase X ESF

ΔkWpeak = HP X LF / ηmotor X CF X DSF

### 3.4.2 Definitions of Terms

 HP = Rated horsepower of the motor

 LF = Load Factor. Ratio between the actual load and the rated load. Motor efficiency curves typically result in motors being most efficient at approximately 75% of the rated load. The default value is 0.75. [[1]](#footnote-2)215

 ηmotor = Motor efficiency at the full-rated load. For VFD installations, this can be either an energy efficient motor or standard efficiency motor. Motor efficiency varies with load and decreases dramatically below 50% load; this is reflected in the ESF term of the algorithm.

 RHRSbase = Annual run hours of the baseline motor

 CF = Demand Coincidence Factor (See Section 1.4)

1. [↑](#footnote-ref-2)