

## SCHEDULES

### SCHEDULE 17

Regulation 35

Measurement methods and calculations for electric motors and variable speed drives

1. The measurement methods and calculations for electric motors and VSDs are as follows.

#### **Electric motors**

2.—(1) The difference between the output mechanical power and the input electrical power due to losses occurring in the motor must be determined using the following methods, based on a 25 °C reference ambient temperature—

- (a) in the case of single-phase motors, by direct measurement of input minus output;
- (b) in the case of three-phase motors, by measuring the losses through the “summation of losses” test procedure set out in British Standard BS EN 60034.

(2) For the eight operating points referred to in paragraph 8(3)(a) of Schedule 16, the losses must be determined by either direct input-output measurement or by calculation.

#### **Variable speed drives**

3.—(1) For the determination of the IE class, the power losses of VSDs (“VSD losses”) must be determined at 100 per cent rated torque-producing current and 90 per cent rated motor stator frequency.

(2) The VSD losses must be determined according to one of the following methods—

- (a) the input minus output method; or
- (b) the calorimetric method (calculating power losses by measuring the heat emitted by the VSD).

(3) The test switching frequency must be 4 kilohertz (kHz) when power is at 111 kVA (90 kW) or below, and 2 kHz when power is above 111 kVA (90 kW), or at the default factory settings as defined by the manufacturer.

(4) VSD losses may be measured at a frequency of up to 12 Hz instead of zero.

(5) Manufacturers or their authorised representatives may also use the single loss determination method for determining VSD losses.

(6) For the purposes of sub-paragraph (5)—

- (a) calculations must be performed with respect to component manufacturer’s data with typical values of power semiconductors at the actual VSD operating temperature or at the maximum operating temperature specified in the datasheet;
- (b) where no component manufacturer data is available, losses must be determined by measurement, as follows—
  - (i) a combination of calculated and measured losses may be used;
  - (ii) the different individual losses must be calculated or measured separately, and the total losses determined as the sum of all individual losses.