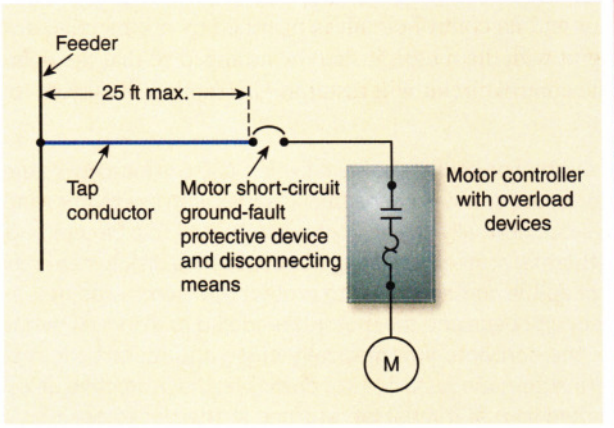

EXHIBIT 430.5 Protective devices (branch-circuit short-circuit and ground-fault) for a motor branch circuit located not more than 25 feet from the point where the conductors are tapped to a feeder.

Solution

Step 1. The tap conductors are required to have a minimum ampacity of 85 A (4 AWG) (1/3 × 255 A = 85 A).

Step 2. The FLC of the motor is 42 A based on 430.6(A) and Table 430.250. Therefore, the motor can be supplied by the 85-A (4 AWG) tap conductor.

Step 3. Because the tap conductors must terminate in a single branch-circuit protective device, the short-circuit protective device rating must be determined. According to 430.52(C)(1), the protective device for the motor cannot exceed the values given in Table 430.52 (C)(1). The maximum time-delay fuse value is 42 × 1.75 = 73.5 A. The maximum inverse time circuit breaker value is 42 × 2.50 = 105 A.

Section 430.52(C)(1)(a) allows the next higher standard size — 80 and 110 A, respectively. A higher size, based on 430.52(C)(1)(b), is allowed if the 80- or 110-A size is not adequate to start the motor.

Step 4. Because overload protection is also required for the motor, determine the rating of the overload protection. Based on 430.32, for a motor with a service factor of 1.15, the motor overload protective devices (heaters) are required to be set at a value not greater than 125 percent of the FLC marked on the motor nameplate and not at the FLC value from the table. A setting of up to 140 percent may be used according to the permissive rules in 430.32(C). With the motor overload protection set at 50 A, the circuit conductors and motor are protected from overload.

430.29 Constant Voltage Direct-Current Motors — Power Resistors. Conductors connecting the motor controller to separately mounted power accelerating and dynamic braking resistors in the armature circuit shall have an ampacity not less than the value calculated from Table 430.29 using motor full-load current. If an armature shunt resistor is used, the power accelerating resistor conductor ampacity shall be calculated using the total of motor full-load current and armature shunt resistor current.

Armature shunt resistor conductors shall have an ampacity of not less than that calculated from Table 430.29 using rated shunt resistor current as full-load current.

TABLE 430.29 *Conductor Rating Factors for Power Resistors*

Time in Seconds		Ampacity of Conductor in Percent of Full-Load Current
On	**Off**	
5	75	35
10	70	45
15	75	55
15	45	65
15	30	75
15	15	85
Continuous Duty		110

Part III. Motor and Branch-Circuit Overload Protection

Δ **430.31 General.** Part III specifies overload devices intended to protect motors, motor-control apparatus, and motor branch-circuit conductors against excessive heating due to motor overloads and failure to start.

Informational Note No. 1: See Informative Annex D, Example D8.

Informational Note No. 2: See Article 100 for the definition of *Overload*.

N **(A) Where Hazard Exists.** These provisions shall not require overload protection where a power loss would cause a hazard, such as in the case of fire pumps.

Informational Note: See 695.7 for protection of fire pump supply conductors.

N **(B) Not Over 1000 Volts.** Part III shall not apply to motor circuits rated over 1000 volts, nominal.

Informational Note: See Part XI for over 1000 volts, nominal.

Overload protection is not designed or may not be capable of breaking short-circuit current or ground-fault current.

430.32 Continuous-Duty Motors.

(A) More Than 1 Horsepower. Each motor used in a continuous duty application and rated more than 1 hp shall be protected against overload by one of the means in 430.32(A)(1) through (A)(4).

Δ **(1) Separate Overload Device.** A separate overload device that is responsive to motor current. This device shall be selected