(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(1) Conductors rated 60°C (140°F).
(2) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.
(3) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.
(4) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(b) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(1) Conductors rated 75°C (167°F)
(2) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

Δ **(2) Separate Connector Provisions.** Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

Informational Note: Equipment markings or listing information may additionally restrict the sizing and temperature ratings of connected conductors.

When equipment of 1000 volts or less is evaluated, conductors sized according to Table 310.16 are required to be used. The UL *Guide Information for Electrical Equipment for Use in Ordinary Locations (AALZ)* located on UL's Product iQ™ database (productiq.ul.com) indicates that the 60°C and 75°C termination temperature ratings for equipment have been determined using conductors from *NEC* Table 310.16. However, installers or designers who are unaware of the UL guide information might attempt to select conductors based on a table other than Table 310.16, especially if a wiring method is used that allows the use of ampacities such as those in Table 310.17, which can result in overheated equipment terminations. The ampacities shown in other tables could be used for various conditions to which the wiring method is subject (such as ambient or ampacity correction conditions), but the conductor size at the equipment termination must be based on ampacities from Table 310.16.

Conductor terminations, as well as conductors, must be rated for the operating temperature of the circuit. For example, the load on an 8 AWG THHN, 90°C copper conductor is limited to 40 amperes where connected to a disconnect switch with terminals rated at 60°C. The same conductor is limited to 50 amperes where connected to a fusible switch with terminals rated at 75°C.

EXHIBIT 110.5 An example of termination temperature marking on a main circuit breaker. *(Courtesy of Siemens Industry, Inc.)*

Not only do termination temperature ratings apply to conductor terminations, but the equipment enclosure marking must also permit terminations above 60°C. Exhibit 110.5 shows an example of termination temperature marking.

Δ **(D) Terminal Connection Torque.** Tightening torque values for terminal connections shall be as indicated on equipment or in installation instructions provided by the manufacturer. An approved means shall be used to achieve the indicated torque value.

Informational Note No. 1: Examples of approved means of achieving the indicated torque values include torque tools or devices such as shear bolts or breakaway-style devices with visual indicators that demonstrate that the proper torque has been applied.

Informational Note No. 2: See UL Standard 486A-486B, *Standard for Safety-Wire Connectors*, Informative Annex I for torque values in the absence of manufacturer's recommendations. The equipment manufacturer can be contacted if numeric torque values are not indicated on the equipment or if the installation instructions are not available.

Informational Note No. 3: See NFPA 70B-2019, *Recommended Practice for Electrical Equipment Maintenance*, Section 8.11 for additional information for torquing threaded connections and terminations.

Because the reliability and safety of terminations depend on proper connection, the use of an approved means is essential. Approved means include the use of a torque wrench, torque screwdriver, shear bolts, and breakaway devices. For wire connectors for which the manufacturer has not assigned a value appropriate for the design, Informative Annex I provides information on the tightening torques from UL 468A-486B, *Wire Connectors*. These tables should be used for guidance only if no tightening information on a specific wire connector is available. They should not be used to replace the manufacturer's instructions, which should always be followed.

UL 486A-486B refers to conductor stranding by class. Terminals and connectors for conductors that are more finely