shall be firestopped using approved methods to maintain the fire resistance rating.

Informational Note: Directories of electrical construction materials published by qualified testing laboratories contain many listing installation restrictions necessary to maintain the fire-resistive rating of assemblies where penetrations or openings are made. Building codes also contain restrictions on membrane penetrations on opposite sides of a fire-resistance-rated wall assembly. An example is the 600-mm (24-in.) minimum horizontal separation that usually applies between boxes installed on opposite sides of the wall. Assistance in complying with the requirements of 300.21 can be found in building codes, fire resistance directories, and product listings.

Cables, cable trays, and raceways must be installed through fire-rated walls, floors, and ceiling assemblies using an approved firestop method so they do not contribute to the spread of fire or the products of combustion. In the UL *Guide Information for Electrical Equipment*, which can be found at productspec.ul.com, Category XHEZ covers through-penetration firestop systems, and Category XHJI covers firestop devices. These two category sections provide valuable information concerning application, installation, and use of firestop systems and firestop devices. A firestop system, the seals for which are shown in Exhibit 300.16, meets the requirements of 300.21.

Using the proper protection techniques is crucial in limiting or stopping flame, excessive temperature, and smoke from passing through fire-rated construction. Sleeves for the protection of cables passing through fire-rated construction must be firestopped to the original rating of the assembly both around the sleeve and around the cables inside the sleeve.

The structural integrity of the floor or wall assembly needs to be evaluated when openings for the penetrating items are being provided. The rating of the building assembly being penetrated by electrical cables or conduits must also be determined. This information is available from construction documents or building codes. Once the fire resistance rating has been determined, the properties and types of electrical penetration required [whether metal or nonmetallic cable(s), conduit(s), or even cable trays] must be determined. Next, the selected method of firestopping must be approved by the AHJ. Building codes generally require that a firestop system or device be tested. ASTM E814-2013, *Standard Test Method for Fire Tests of Penetration Firestop Systems*, and ANSI/UL 1479-2015, *Fire Tests of Penetration Firestops*, are two examples of such test methods. Certain construction practices can be used in lieu of tested systems or devices. NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*, as well as some building codes, contains a statement somewhat similar to the following:

> Where concrete, grout, or mortar has been used to fill the annular spaces around . . . steel conduit or tubing that penetrates one or more concrete or masonry walls, the nominal diameter of each penetrating item shall not exceed 6 in., the opening size shall not exceed 144 in.^{2}, and the thickness of the concrete, grout, or mortar shall be the full thickness of the assembly.

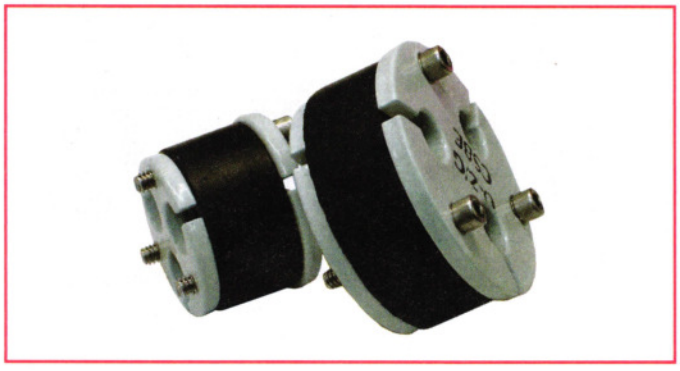

EXHIBIT 300.16 Fire seals used in a through-penetration firestop system to maintain the fire resistance rating of the wall. *(Courtesy of O-Z/Gedney, a division of EGS Electrical Group)*

300.22 Wiring in Ducts Not Used for Air Handling, Fabricated Ducts for Environmental Air, and Other Spaces for Environmental Air (Plenums). The requirements of this section shall apply to the installation and uses of electrical wiring and equipment in ducts used for dust, loose stock, or vapor removal; ducts specifically fabricated for environmental air; and other spaces used for environmental air (plenums).

Informational Note: See Part VI of Article 424 for requirements on duct heaters.

Other codes and standards refer to all spaces that move air as plenums, including spaces that the *NEC* identifies as "other spaces." Some of the terms used to describe this space include *plenum*, *ceiling cavity plenum*, and *raised floor plenum*. Products are often required to be marked as "suitable for use in other spaces for environmental air" or equivalent language to comply with requirements in the *NEC*.

Section 300.22(B) addresses ducts and spaces used solely for the movement of environmental air. In 300.22(C), the term *plenum* appears with *other spaces used for environmental air* to make it clear that it applies to structures that are not fabricated specifically to handle environmental air as the primary purpose but that handle the air, nonetheless.

(A) Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

(B) Ducts Specifically Fabricated for Environmental Air. Equipment, devices, and the wiring methods specified in this section shall be permitted within such ducts only if necessary for the direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires shall be permitted.

Only wiring methods consisting of Type MI cable without an overall nonmetallic covering, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall