(B) Wiring. Wiring from a photovoltaic panel or wiring external to the PV sign body shall be:

(1) Listed, labeled, and suitable for photovoltaic applications
(2) Routed to closely follow the sign body or enclosure
(3) As short as possible and secured at intervals not exceeding 0.91 m (3 ft)
(4) Protected where subject to physical damage

(C) Flexible Cords and Cables. Flexible cords and cables shall comply with Article 400 and be identified as extra hard usage, rated for outdoor use, and water and sunlight resistant.

(D) Grounding. Grounding a PV powered sign shall comply with Article 690, Part V and 600.7.

(E) Disconnecting Means. The disconnecting means for a PV powered sign shall comply with Article 690, Part III and 600.6.

(F) Battery Compartments. Battery compartments shall require a tool to open.

600.35 Retrofit Kits.

(A) General. A general-use or sign-specific retrofit kit for a sign or outline lighting system shall include installation instructions and requirements for field conversion of a host sign. The retrofit kit shall be listed and labeled.

See also

Article 100 for definitions of *host sign; retrofit kit, general use (general use retrofit kit);* and *retrofit kit, sign specific (sign specific retrofit kit)*

(B) Damaged Parts. All parts that are not replaced by a retrofit kit shall be inspected for damage. Any part found to be damaged or damaged during conversion of the sign shall be replaced or repaired to maintain the sign or outline lighting system's dry, damp, or wet location rating.

(C) Marking. The retrofitted sign shall be marked in accordance with 600.4(B).

600.41 Neon Tubing.

(A) Design. The length and design of the tubing shall not cause a continuous overcurrent beyond the design loading of the transformer or electronic power supply.

(B) Support. Tubing shall be supported by listed tube supports. The neon tubing shall be supported within 150 mm (6 in.) from the electrode connection.

(C) Spacing. A spacing of not less than 6 mm (¼ in.) shall be maintained between the tubing and the nearest surface, other than its support.

(D) Protection. Field-installed skeleton tubing shall not be subject to physical damage. Where the tubing is readily accessible to other than qualified persons, field-installed skeleton tubing shall be provided with suitable guards or protected by other approved means.

600.42 Electrode Connections.

(A) Points of Transition. Where the high-voltage secondary circuit conductors emerge from the wiring methods specified in 600.32(A), they shall be enclosed in a listed assembly.

(B) Accessibility. Terminals of the electrode shall not be accessible to unqualified persons.

(C) Electrode Connections. Connections shall be made by use of a connection device, twisting of the wires together, or use of an electrode receptacle. Connections shall be electrically and mechanically secure and shall be in an enclosure listed for the purpose.

(D) Support. Neon secondary conductor(s) shall be supported not more than 150 mm (6 in.) from the electrode connection to the tubing.

(E) Receptacles. Electrode receptacles shall be listed.

(F) Bushings. Where electrodes penetrate an enclosure, bushings listed for the purpose shall be used unless receptacles are provided.

(G) Wet Locations. A listed cap shall be used to close the opening between neon tubing and a receptacle where the receptacle penetrates a building. Where a bushing or neon tubing penetrates a building, the opening between neon tubing and the bushing shall be sealed.

(H) Electrode Enclosures. Electrode enclosures shall be listed.

(1) Dry Locations. Electrode enclosures that are listed, labeled, and identified for use in dry, damp, or wet locations shall be permitted to be installed and used in such locations.

(2) Damp and Wet Locations. Electrode enclosures installed in damp and wet locations shall be specifically listed, labeled, and identified for use in such locations.

Informational Note: See 110.3(B) covering installation and use of electrical equipment.

ARTICLE 604 Manufactured Wiring Systems

604.1 Scope. This article applies to field-installed wiring using off-site manufactured subassemblies for branch circuits, remote-control circuits, signaling circuits, and communications circuits in accessible areas.

604.6 Listing Requirements. Manufactured wiring systems and associated components shall be listed.

Informational Note: See ANSI/UL 183, *Standard for Manufacturing Wiring Systems*, the safety standard for manufactured wiring systems.

604.7 Installation. Manufactured wiring systems shall be secured and supported in accordance with the applicable cable or conduit article for the cable or conduit type employed.

The securing and supporting requirements for manufactured wiring systems are taken from the specific article in Chapter 3 that covers the wiring method employed in the system construction. Typically, manufactured wiring systems are constructed of armored cable (Type AC), covered by Article 320, or of metal-clad cable (Type MC), covered by Article 330.

604.10 Uses Permitted. Manufactured wiring systems shall be permitted in accessible and dry locations and in ducts, plenums, and other air-handling spaces where listed for this application and installed in accordance with 300.22.

Exception No. 1: In concealed spaces, one end of tapped cable shall be permitted to extend into hollow walls for direct termination at switch and outlet points.

Exception No. 2: Manufactured wiring system assemblies installed outdoors shall be listed for use in outdoor locations.

Manufactured wiring systems are constructed of Type AC or Type MC cable and are provided with factory connectors and receptacles. The connection devices used with these systems facilitate ease of initial installation and future relocation of equipment. These systems are used extensively for the installation of branch-circuit and tap conductors supplying luminaires in accessible locations, including open and suspended-ceiling construction. Manufactured wiring systems employing flexible conduits, flexible cords, busways, and surface-mounted raceways also are permitted by this article.

604.12 Uses Not Permitted. Manufactured wiring system types shall not be permitted where limited by the applicable article in Chapter 3 for the wiring method used in its construction.

604.100 Construction.

(A) Cable, Conduit, and Tubing Types.

(1) Cables. Cable shall be listed Type AC cable or listed Type MC cable containing nominal 600-volt, 8 AWG to 12 AWG insulated copper-clad aluminum or copper conductors.

Other cables as listed in 722.135, 800.113, and 830.179 shall be permitted in manufactured wiring systems for wiring of equipment within the scope of their respective articles.

(2) Conduits and Tubing. Conduit shall be listed flexible metal conduit (FMC), listed liquidtight flexible metal conduit (LFMC), liquidtight flexible nonmetallic conduit (LFNC), or electrical metallic tubing (EMT) containing nominal 600-volt, 8 AWG to 12 AWG insulated copper-clad aluminum or copper conductors with a bare or insulated copper-clad aluminum or copper equipment grounding conductor equivalent in size to the ungrounded conductor.

Exception No. 1 to (1) and (2): A luminaire tap, no longer than 1.8 m (6 ft) and intended for connection to a single luminaire, shall be permitted to contain conductors smaller than 12 AWG but not smaller than 18 AWG.

Exception No. 2 to (1) and (2): Listed manufactured wiring assemblies containing conductors smaller than 12 AWG shall be permitted for remote-control, signaling, or communications circuits.

Exception No. 3 to (2): Listed manufactured wiring systems containing unlisted flexible metal conduit of noncircular cross section or trade sizes smaller than permitted by 348.20(A), or both, shall be permitted where the wiring systems are supplied with fittings and conductors at the time of manufacture.

(3) Flexible Cord. Flexible cord suitable for hard usage, with minimum 12 AWG conductors, shall be permitted as part of a listed factory-made assembly not exceeding 1.8 m (6 ft) in length when making a transition between components of a manufactured wiring system and utilization equipment not permanently secured to the building structure. The cord shall be visible for the entire length, shall not be subject to physical damage, and shall be provided with identified strain relief.

Flexible cord facilitates a transition between manufactured wiring systems and utilization equipment found in display cases, merchandise racks, temporary workstations, and the like. This transition is limited, however, to hard-usage cord not over 6 feet in length to minimize damage, as illustrated in Exhibit 604.1. Examples of polarized receptacles and connectors are shown in Exhibit 604.2.

Exception: Listed electric-discharge luminaires that comply with 410.62(C) shall be permitted with conductors smaller than 12 AWG.

This exception and the requirements in 410.62(C)(1) permit the use of flexible cord equipped with a manufactured wiring system connector as a means to supply listed electric-discharge luminaires such as fluorescent or high-intensity discharge types. In this application, the cord-equipped luminaires are supplied from branch-circuit conductors installed using a manufactured wiring system. This method of supplying luminaires is permitted only where the cord is visible for its entire length, from its attachment to the luminaire to its interface with the branch-circuit conductors of the manufactured wiring system. Where used for connection of listed electric-discharge luminaires, listed manufactured wiring system cord assemblies not longer than 6 feet and containing conductors smaller than 12 AWG copper are permitted.

(4) Busways. Busways shall be listed continuous plug-in type containing factory-mounted, bare or insulated conductors, which shall be copper or aluminum bars, rods, or tubes. The busway shall be provided with an equipment ground. The busway shall

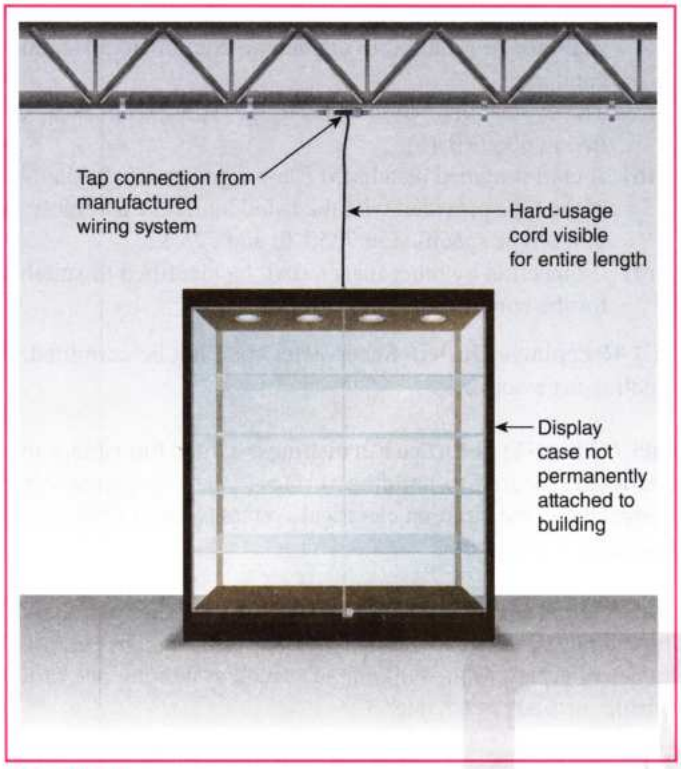

EXHIBIT 604.1 Transition wiring between a manufactured wiring system and utilization equipment.

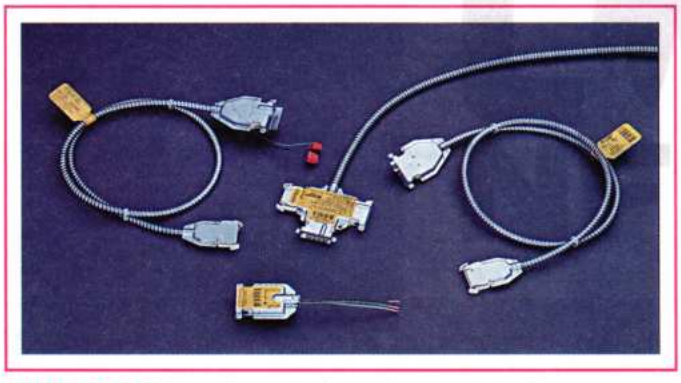

EXHIBIT 604.2 Polarized receptacles and connectors of a manufactured wiring system. *(Courtesy of RELOC® Wiring Solutions, an Acuity Brands Company)*

be rated nominal 600 volts, 20, 30, or 40 amperes. Busways shall be installed in accordance with 368.12, 368.17(D), and 368.30.

(5) Raceway. Prewired, modular, surface-mounted raceways shall be listed for the use, rated nominal 600 volts, 20 amperes, and installed in accordance with 386.12, 386.30, 386.60, and 386.100.

Metal and nonmetallic surface-mounted raceways prewired as a manufactured wiring system are required to be listed specifically for the application. ANSI/UL 183, *Standard for Manufactured Wiring Systems*, covers the construction of these systems. Article 380 contains the requirements for the installation of surface, flush, or freestanding raceways that contain conductors and receptacles. Although multioutlet assemblies are permitted to be assembled in the field, listed multioutlet assemblies are covered by ANSI/UL 5, *Surface Metal Raceways and Fittings*, and ANSI/UL 5A, *Nonmetallic Surface Raceways and Fittings*.

(B) Marking. Each section shall be marked to identify the type of cable, flexible cord, or conduit.

(C) Receptacles and Connectors. Receptacles and connectors shall be of the locking type, uniquely polarized and identified for the purpose, and shall be part of a listed assembly for the appropriate system. All connector openings shall be designed to prevent inadvertent contact with live parts or capped to effectively close the connector openings.

(D) Other Component Parts. Other component parts shall be listed for the appropriate system.

ARTICLE
605 Office Furnishings

605.1 Scope.

(A) Covered. This article covers electrical equipment, lighting accessories, and wiring systems used to connect, contained within, or installed on office furnishings.

(B) Not Covered. This article does not apply to individual office furnishings not connected to a system, such as chairs, freestanding desks, tables, storage units, and shelving units.

This article covers electrical equipment and conductors installed in office furnishings. Office furnishings may be partitions that are freestanding or fixed but are not as permanent as a conventional stud-and-wallboard type of partition. They may also be storage units, desks, and workstations that are interconnected much in the same way traditional office partitions are connected. This article does not cover office furnishings that are not connected to a powered office furnishing system. The electrical equipment and devices shown in Exhibit 605.1 are components of a modular office furnishing system.

605.3 General. Wiring systems shall be identified as suitable for providing power for lighting accessories and utilization equipment used within office furnishings. A wired partition shall not extend from floor to ceiling.

Exception: Where permitted by the authority having jurisdiction, these relocatable wired partitions shall be permitted to extend to, but shall not penetrate, the ceiling.

605.4 Wireways. All conductors and connections shall be contained within wiring channels of metal or other material identified as suitable for the conditions of use. Wiring channels shall be free of projections or other conditions that might damage conductor insulation.

EXHIBIT 605.1 Example of a fixed-type office partition where the branch-circuit wiring is run inside the partition.

A wiring channel that is separate from the channel containing the branch circuits for light and power may be provided within the system components for the routing of communications, signaling, and optical fiber cables.

605.5 Office Furnishing Interconnections. The electrical connection between office furnishings shall be a flexible assembly identified for use with office furnishings or shall be permitted to be installed using flexible cord, provided that all the following conditions are met:

(1) The cord is extra-hard usage type with 12 AWG or larger conductors, with an insulated equipment grounding conductor.
(2) The office furnishings are mechanically contiguous.
(3) The cord is not longer than necessary for maximum positioning of the office furnishing but is in no case to exceed 600 mm (2 ft).
(4) The cord is terminated at an attachment plug-and-cord connector with strain relief.

605.6 Lighting Accessories. Lighting equipment shall be listed, labeled, and identified for use with office furnishings and shall comply with 605.6(A), (B), and (C).

(A) Support. A means for secure attachment or support shall be provided.

(B) Connection. Where cord and plug connection is provided, it shall comply with all of the following:

(1) The cord length shall be suitable for the intended application but shall not exceed 2.7 m (9 ft) in length.
(2) The cord shall not be smaller than 18 AWG.
(3) The cord shall contain an equipment grounding conductor, except as specified in 605.6(B)(4).
(4) Cords on the load side of a listed Class 2 power source shall not be required to contain an equipment grounding conductor.
(5) The cord shall be of the hard usage type, except as specified in 605.6(B)(6).
(6) A cord provided on a listed Class 2 power source shall be of the type provided with the listed luminaire assembly or of the type specified in 725.130 and 725.127.
(7) Connection by other means shall be identified as suitable for the conditions of use.

(C) Receptacle Outlet. Receptacles shall not be permitted in lighting accessories.

605.7 Fixed-Type Office Furnishings. Office furnishings that are fixed (secured to building surfaces) shall be permanently connected to the building electrical system by one of the wiring methods of Chapter 3.

605.8 Freestanding-Type Office Furnishings. Office furnishings of the freestanding type (not fixed) shall be permitted to be connected to the building electrical system by one of the wiring methods of Chapter 3.

Office furnishings that are attached to the building are required by 605.7 to be connected to the premises wiring with a permanent wiring method. Freestanding furnishings are permitted by 605.8 to connect with a permanent wiring method or by 605.9 to connect with a flexible cord. Although multiwire branch circuits are not permitted in cord-connected furnishings by 605.9(D), they may be supplied by multiple branch circuits.

605.9 Freestanding-Type Office Furnishings, Cord- and Plug-Connected. Individual office furnishings of the freestanding type, or groups of individual office furnishings that are electrically connected, are mechanically contiguous, and do not exceed 9.0 m (30 ft) when assembled, shall be permitted to be connected to the building electrical system by a single flexible cord and plug, provided that all of the conditions of 605.9(A) through (D) are met.

(A) Flexible Power-Supply Cord. The flexible power supply cord shall be extra-hard usage type with 12 AWG or larger conductors, with an insulated equipment grounding conductor, and shall not exceed 600 mm (2 ft) in length.

(B) Receptacle Supplying Power. The receptacle(s) supplying power shall be on a separate circuit serving only the office furnishing and no other loads and shall be located not more than 300 mm (12 in.) from the office furnishing that is connected to it.

(C) Receptacle, Maximum. An individual office furnishing or groups of interconnected individual office furnishings shall not contain more than 13 15-ampere, 125-volt receptacles. For purposes of this requirement, a receptacle is considered (1) up to two (simplex) receptacles provided within a single enclosure