

Instructions:

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1. Print these pages.
2. Circle the correct answers and transfer them to the [answer sheet](#).
3. Page down to the last page for the [verification forms](#) and mailing instructions.
4. Use the included analysis information as your reference materials.
5. 80 questions are listed in a straight order mini-section format throughout the complete quiz.

Course: 17148 2014 NEC Analysis Part 3

This course is valid for these credentials:

Credential Description	Cred Code	Credit Hours
Registered/Beginner Electrician	BE	8.0
Commercial Electrical Inspector	CEI	8.0
Industrial Journeyman Electrician	IJE	8.0
Journeyman Electrician	JE	8.0
Master Electrician	ME	8.0
Residential Journeyman Electrician	RJE	8.0
Residential Master Electrician	RME	8.0
UDC-Electrical Inspector	UEI	8.0

2014 NEC Analysis Part 3

250.167 New section requiring ground-fault detection on dc systems was added to "Direct-Current Ground-Fault Detection."

2011 NEC Requirement. There were no requirements for ground-fault detection for dc systems in the 2011 NEC.

2014 NEC Change. A new section was added to "Direct-Current Ground-Fault Detection" requiring ground fault detection on dc systems. These new requirements address grounded systems, ungrounded systems, and marking rules for each.

250.186 New section for "Ground Fault Circuit Conductor Brought to Service Equipment" was added to require services over 1000 volts to have a grounded conductor to be brought to the service for a grounded system. Ungrounded systems (over 1000 volts) will require a supply side bonding jumper brought to the service.

2011 NEC Requirement. Section 250.24(C) requires a grounded (neutral) conductor to be brought to the service equipment for grounded systems, but this provision is limited to systems of 1000 volts or below.

2014 NEC Change. New 250.186 will now require services of over 1000 volts to have a grounded (neutral) conductor to be established at the service for a grounded system. Ungrounded systems (over 1000 volts) will require a supply side bonding jumper brought to the service equipment.

250.194 New section was added for bonding and grounding metal fences and other metal structures around substations.

2011 NEC Requirement. No provisions existed in the 2011 *NEC* for grounding and bonding of metal fences and metal structures, particularly when the voltage is over 1000 volts.

2014 NEC Change. A new section was added to Part X, Grounding of Systems and Circuits of over 1000 Volts, of Article 250 entitled "Grounding and Bonding of Fences and Other Metal Structures." This new section provides new rules for bonding and grounding fences and other metal structures around substations.

285.13 Type 4 component assemblies and Type 5 SPDs are incomplete devices that are only acceptable when provided as part of listed equipment.

2011 NEC Requirement. Type 4 component assemblies and other component type SPDs were not addressed in the 2011 NEC.

2014 NEC Change. A new section, entitled "Type 4 and Other Component Type SPDs," was added to indicate that Type 4 component assemblies and Type 5 SPDs are incomplete devices that are only acceptable when provided as part of listed equipment. This new section will clarify that component SPD(s) are not to be installed in the field.

300 & 300.1(A) Title to Article 300 has been revised. Similar revision to 300.1, Scope, was made to better reflect what is covered by Chapter 3 and Article 300.

2011 NEC Requirement. The title of Chapter 3 was "Wiring Methods and Materials" with the title of Article 300 being "Wiring Methods." The scope of Article 300 at 300.1 (A) stated that Article 300 "covers wiring methods for all wiring installations unless modified by other articles,"

2014 NEC Change. The title of Article 300 was revised from "Wiring Methods" to "General Requirements for Wiring Methods and Materials," The scope of Article 300 was revised to give a better understanding that the articles in Chapter 3 not only cover the wiring methods in Chapter 3, but the materials used in Chapter 3 as well.

300.6(A) A new Informational Note was added indicating what constitutes "field-cut threads."

2011 NEC Requirement. The provisions of 300.6 require electrical equipment such as raceways, cabinets, couplings, fittings, etc. to be made of materials suitable for the environment in which they will be installed. Section 300.6(A) requires ferrous metal race ways and other electrical equipment such as boxes, elbows, etc., to be suitably protected against corrosion inside and outside by a coating of approved corrosion-resistant material. This subsection goes further to require conduits that are threaded in the field to have their threads coated with an approved electrically conductive, corrosion-resistant compound where necessary. An exception to this protective corrosion-resistant compound exists for stainless steel raceways and other electrical equipment.

2014 NEC Change. A new Informational Note was added after 300.6(A) detailing that field-cut threads are those threads that are field-applied or cut in conduit, elbows, or nipples anywhere other than at the factory where the product is produced and listed.

1. A new section was _____ to "Direct-Current Ground-Fault Detection" requiring ground fault detection on dc systems. These new requirements address grounded systems, ungrounded systems, and marking rules for each.
 - a. removed
 - b. revised
 - c. relocated
 - d. added
2. New 250.186 will now require services of over 1000 volts to have a _____ conductor to be established at the service for a grounded system.
 - a. grounded
 - b. neutral
 - c. both a & b
 - d. none of the above
3. Ungrounded systems (over 1000 volts) will require a _____ side bonding jumper brought to the service equipment.
 - a. load
 - b. neutral
 - c. grounded
 - d. supply
4. A new section was _____ to Part X, Grounding of Systems and Circuits of over 1000 Volts, of Article 250 entitled "Grounding and Bonding of Fences and Other Metal Structures."
 - a. removed
 - b. revised
 - c. relocated
 - d. added
5. A new section, entitled "Type _____ and Other Component Type SPDs," was added to indicate that this Type of component assemblies and Type 5 SPDs are incomplete devices that are only acceptable when provided as part of listed equipment.
 - a. 2

- b.3
 - c. 4
 - d. 5
6. This new section will clarify that component SPD(s) _____ installed in the field.
- a. are not to be
 - b. are to be
 - c. both a & b
 - d. none of the above
7. The title of Article 300 was _____ from "Wiring Methods" to "General Requirements for Wiring Methods and Materials,"
- a. removed
 - b. revised
 - c. relocated
 - d. added
8. The scope of Article 300 was revised to give a better understanding that the articles in Chapter 3 covers the _____ in Chapter 3 as well.
- a. wiring methods
 - b. materials used
 - c. both a & b
 - d. none of the above
9. A new Informational Note was added after 300.6(A) detailing that field-cut threads are those threads that are field-applied or cut in conduit, elbows, or nipples anywhere other than at the _____ where the product is produced and listed.
- a. warehouse
 - b. shop
 - c. factory
 - d. all of the above

300.11(B)(1) Raceways can be used as a means of support where the raceway is identified "as a means of support."

2011 NEC Requirement. Raceways were permitted to be used as a means of support for other raceways, cables, or nonelectrical equipment where the raceway or means of support was "identified for the purpose."

2014 NEC Change. A revision to 300.11 (B)(1) still permits raceways to be used as a means of support for other raceways, cables, or nonelectrical equipment, but the raceway or means of support must now be "identified as a means of support," not just "identified for the purpose."

300.22(C)(1) Cable ties used to secure cables in plenums must be listed as having fire-resistant and low-smoke producing characteristics.

2011 NEC Requirement. Wiring methods used in spaces used for environmental air (plenums) have to be specifically listed for use within an air-handling space. A list of wiring methods identified for this use is provided at 300.22(0)(1). Even though the wiring methods were required to be "specifically listed for use within an air-handling space," the nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in these plenums did not have to be listed for compliance within an air-handling space.

2014 NEC Change. A new sentence was added at the end of 300.22(0)(1) for wiring methods installed in spaces used for environmental air (plenums). This will require nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in these spaces to be listed as having low-smoke and heat-release properties and characteristics. A new informational note was also added that will provide pertinent information related to low smoke and heat release properties for nonmetallic cable ties.

300.38 Interior of raceways installed in wet locations above grade are now considered to be a wet location for installations of over 1000 volts, nominal.

2011 NEC Requirement. The interior of enclosures or raceways installed underground are considered to be

a wet location by 300.5(B) for installations of 600 volts (now 1000 volts) or less. The interior of raceways installed above ground are considered to be a wet location by 300.9 for installations of 600 volts (now 1000 volts) or less. The interior of enclosures or raceways installed underground are considered to be a wet location by 300.50(B) for installations over 600 volts (now 1000 volts), nominal. No provisions existed in the 2011 NEC dealing with the interior of a raceway installed above ground for installations over 600 volts (now 1000 volts), nominal.

2014 NEC Change. A new section was added to Part II (over 1000 volts, nominal) of Article 300 to indicate that the interior of raceways installed in wet locations above grade are now considered to be a wet location. This will bring aboveground installation requirements for over 1000 volts consistent with the requirements in 300.9 for 1000 volts and under.

310.10(H)(2) Parallel conductor installations were expanded to include grouping requirements for induction purposes.

2011 NEC Requirement. Conductors installed in parallel are generally required to be sized at 1/0 or larger. These parallel conductors are also required to be of the same length, consist of the same conductor material, be of the same size in circular mil area, have the same insulation type, and be terminated in the same manner.

2014 NEC Change. A new item (6) was added to not only require the conductor characteristics required by the previous Code, but also to require paralleled conductors installed in ferrous metal enclosures or raceways to be grouped with all conductors of the same circuit to prevent heating effects from imbalances of current.

310.15(B)(3)(a) and Table 310.15(B)(3)(a). Titles of 310.15(B)(3)(a) and corresponding table were changed to "More Than Three Current-Carrying Conductors in a Race way or Cable." Note to Table 310.15(B)(3)(a) was revised to make it clear that the table applies to spare conductors but does not apply to conductors that cannot be simultaneously energized.

2011 NEC Requirement. The titles of both 310.15(B)(3)(a) and Table 310.15(B)(3)(a) indicated that adjustment factors for more than three current-carrying conductors applied only when this situation occurred within a raceway or cable. The parent text at 310.15(B)(3)(a) went on to specify that these adjustment factors applied where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways. The note following Table 310.15(B)(3)(a) stated that the table applied to the total number of conductors in the raceway or cable, but did not include the neutral conductor in certain conditions or the equipment grounding conductor adjusted in accordance with 310.15(B)(5) and (6).

2014 NEC Change. The titles of both 310.15(B)(3)(a) and Table 310.15(B)(3)(a) were changed from "More Than Three Current-Carrying Conductors in a Raceway or Cable" to "More Than Three Current-Carrying Conductors" to correspond to the text at 310.15(B)(3)(a). The note to Table 310.15(B)(3)(a) was revised to make it clear that the table applies to the total number of conductors in the raceway or cable, etc., as well as to spare conductors; but the table does not apply to conductors that cannot be simultaneously energized.

310.15(B)(3)(c) EX and Table 310.15(B)(3)(c) Title was revised for clarity and a new exception was added to permit the use of Type XHHW-2 conductors in raceways or cables on rooftops without having to apply an ambient temperature adjustment correction factor.

2011 NEC Requirement. The 2011 NEC demanded an ambient temperature adjustment correction factor where conductors or cables are installed in circular raceways exposed to direct sunlight on or above rooftops. The adjustments shown in Table 310.15(B)(3)(c) had to be added to the average ambient outdoor temperatures to determine the applicable ambient temperature for application of the correction factors. These correction factors can be found in Table 310.15(B)(2)(a) for ambient temperatures other than 30° C (86° F) when the ampacity starting point is 30° C (86° F) from Table 310.15(B)(16). For ampacity values based on 40° C (104°F), correction factors for ambient temperatures other than 40° C (104°F) can be found at Table 310.15(B)(2)(b).

2014 NEC Change. The title and parent text at 310.15(B)(3)(c) was revised for clarity from "Circular Raceways Exposed to Sunlight on Rooftops" to "Raceways and Cables Exposed to Sunlight on Rooftops." The basic provisions for applying an ambient temperature adjustment correction factor where any type of raceway (not just circular race ways) is exposed to direct sunlight on or above rooftops have not changed. Provisions for

cables installed on or above rooftops have been added as well. Cables were subject to these ambient temperature adjustment correction factors in the past, but the language indicated that the cable(s) had to be installed in a raceway. A new exception was also added that will allow the employment of Type XHHW-2 conductors, which is a thermoset insulated conductor, to be installed in raceways or cables on rooftops without having to apply an ambient temperature adjustment correction factor for these conductors.

10. A revision to 300.11 (B)(1) still permits raceways to be used as a means of support for other raceways, cables, or nonelectrical equipment, but the raceway or means of support must now be "_____".
 - a. identified as a means of support
 - b. identified for the purpose
 - c. both a & b
 - d. none of the above
11. 300.22(C)(1) Cable ties used to secure cables in plenums must be _____ as having fire-resistant and low-smoke producing characteristics.
 - a. approved
 - b. identified
 - c. marked
 - d. listed
12. A new sentence was added at the end of 300.22(0)(1) for wiring methods installed in spaces used for environmental air (plenums). This will require nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in these spaces to be listed as having _____ properties and characteristics.
 - a. low-smoke
 - b. heat-release
 - c. both a & b
 - d. none of the above
13. A new section was added to Part II (over 1000 volts, nominal) of Article 300 to indicate that the interior of raceways installed in wet locations above grade are now considered to be a _____ location.
 - a. damp
 - b. dry
 - c. wet
 - d. none of the above
14. A new item (6) was added to not only require the conductor characteristics required by the previous Code, but also to require paralleled conductors installed in ferrous metal enclosures or raceways to be _____ with all conductors of the same circuit to prevent heating effects from imbalances of current.
 - a. separated
 - b. grouped
 - c. divided
 - d. none of the above
15. The titles of both 310.15(B)(3)(a) and Table 310.15(B)(3)(a) were changed from "_____ " to correspond to the text at 310.15(B) (3)(a).
 - a. More Than four Current-Carrying Conductors in a Raceway or Cable to More Than four Current-Carrying Conductors
 - b. More Than Three Current-Carrying Conductors in a Raceway or Cable to More Than Three Current-Carrying Conductors
 - c. More Than Three Current-Carrying Conductors to More Than Three Current-Carrying Conductors in a Raceway
 - d. none of the above
16. The title and parent text at 310.15(B)(3)(c) was revised for clarity from "_____ " The basic provisions for applying an ambient temperature adjustment correction factor where any type of raceway (not just circular race ways) is exposed to direct sunlight on or above rooftops have not changed.
 - a. Circular Raceways Exposed to Sunlight on Rooftops to Raceways and Cables Exposed to Sunlight on Rooftops
 - b. Non-Circular Raceways Exposed to Sunlight on Rooftops to Raceways and Cables Exposed to Sunlight on Rooftops

c. Raceways and Cables Exposed to Sunlight on Rooftops to Circular Raceways Exposed to Sunlight on Rooftops

d. none of the above

17. A new exception was also added that will allow the employment of Type _____ conductors, which is a thermoset insulated conductor, to be installed in raceways or cables on rooftops without having to apply an ambient temperature adjustment correction factor for these conductors.

a. XHHW-1

b. XHHW-2

c. XHHW-3

d. all of the above

310.15(B)(7) This revision deletes Table 310.15(8)(7) and replaces it with a provision allowing an 83% revision in ampacity for dwelling service and feeder conductors.

2011 NEC Requirement. The service-entrance, service-lateral and the main power feeder conductors for dwelling units served at 120/240-volts, 3-wire, single-phase were permitted to be sized by 310.15(B)(7) and Table 310.15(B)(7). The table had an ampacity rating for the service or main power feeder from 100 to 400 amperes, with wire sizes from 4 AWC to 400 kcmil copper and 2 AWG to 600 kcmil aluminum. This table was also permitted to be used for the feeder conductors that serve as the main power feeder to a dwelling unit. The main power feeder being defined as "...the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit." To use Table 310.15(8)(7) for selection of the main power feeder, this feeder would have had to supply all loads associated with the dwelling unit.

2014 NEC Change. The existing Table 310.15(B)(7) has been deleted entirely. The parent text at 310.15(B)(7) has been revised and broken up into four list items. Rather than use previous Table 310.15(B)(7) for sizing service conductors and the main power feeder for dwelling units, the user of the Code is left with a calculation to perform. The ampacity values found at Table 310.15(B)(16) can be reduced by 17 percent (not less than 83 percent of the service or feeder rating), which will require the circular mils properties of Table 8 in Chapter 9 to be brought into the now required calculation. A new Informational Note will take users of the Code to Example D.7 in Annex D for a

314.15 All outlet box hood covers are required to be listed for use in a wet location, not just extra duty outlet box hood covers installed in wet locations.

2011 NFC Requirement. Section 406.9(B)(1) required "extra duty" outlet box hoods installed in a wet location to be listed for use in a wet location. Section 314.15 required only boxes, conduit bodies, and fillings installed in wet locations to be listed for use in wet locations.

2014 NFC Change. The term outlet box hoods were added at this section. Boxes, conduit bodies, outlet box hoods, and fittings installed in wet locations are now required to be listed for use in wet locations.

314.15 New provision was added to permit field-installed drainage openings in boxes or conduit bodies in accordance with the manufacturer's instructions.

2011 NEC Requirement. The 2011 NEC had no language to allow field-installed weep holes to be installed in the bottom of boxes and conduit linings, although this was a fairly common practice by installers.

2014 NEC Change. A new sentence was added at the end of 314.15 to permit approved drainage openings to be installed in the field in boxes or conduit bodies listed for use in damp or wet locations in accordance with manufacturer's instructions. These weep holes cannot be larger than 6 mm (1/4 in.).

314.23(B) Enclosures can be supported from any structural member, not just from a structural member of a building.

2011 NEC Requirement. Outlet, device, junction or pull boxes, conduit body, or fitting that were supported from a structural member had to be supported from a structural member of a building.

2014 NEC Change. The words "of a building" were removed to indicate that an enclosure within the scope of Article 314 could be supported from any structural member, not just a structural member of a building.

314.25 Drywall screws are not permitted to be used to attach box covers or other equipment fastened to a box. Cover and canopy screws need to be suitable for this purpose.

2011 NEC Requirement. The requirement at 314.25 generally required boxes to have covers, face plates, etc., installed for a complete installation; but the means of attachment for these covers was not addressed.

2014 NEC Change. A new sentence was added at the end of 314.25 addressing the attachment means for covers or other equipment attached to a box. Screws used for this purpose are now required to be either machine screws matching the thread gauge or of a size that is integral to the box. The screws and attachment process can also be installed in accordance with the manufacturer's instructions.

314.27(A)(1) Requirements of 314.27(A) (1) apply to outlet boxes used to support luminaires and lampholders mounted on vertical surfaces (not just on walls).

2011 NEC Requirement. Outlet boxes used to support luminaires and lampholders are divided into two subsections. Wall-mounted luminaires are addressed at 314.27(A)(1) and ceiling mounted luminaires are covered at 314.27(A){2}. Outlet boxes or fittings used to support luminaires and lampholders must be designed (identified) for this support means. Outlet boxes mounted in a wall used to support luminaire or lampholder outlets must be marked on the interior of the box to indicate the maximum weight of the luminaire that is permitted to be supported by the box in the wall, if other than 2:J kg (50 lb.). An exception to the requirement that the box needs to be designed or identified for the support of a luminaire or lampholder allows a wall-mounted luminaire or lampholder weighing not more than 3 kg (6 lb.) to be supported on "other boxes" or plaster rings that are secured to other boxes, provided that the luminaire or its supporting yoke, or the lampholder, is secured to the box with no fewer than two No. 6 or larger screws. An example of "other boxes" would be a box that is not designed to support a luminaire or lampholder such as a single-gang, nonmetallic outlet box typically used for the installation of a switch or a receptacle.

2014 NEC Change. The title of 314.27(A)(1) was changed from "Wall Outlets" to "Vertical Surface Outlets" as not all vertical surfaces where luminaires or lampholders are mounted are necessarily in a wall. Text was also revised in the subsection and the exception reflecting this vertical surface vs. wall surface fact. New language was also added to reflect that luminaires or lampholders can be mounted on a vertical service as well as in a vertical service.

18. The existing Table 310.15(B)(7) has been _____ entirely.

- a. deleted
- b. revised
- c. relocated
- d. added

19. The parent text at 310.15(B)(7) has been revised and broken up into four list items. Rather than use previous Table 310.15(B)(7) for sizing service conductors and the main power feeder for dwelling units, the user of the Code is left with a calculation to perform. The ampacity values found at Table 310.15(B)(16) can be reduced by _____, which will require the circular mils properties of Table 8 in Chapter 9 to be brought into the now required calculation.

- a. 17 percent
- b. not less than 83 percent of the service or feeder rating
- c. not less than 17 percent of the service or feeder rating
- d. both a & b

20. A new Informational Note will take users of the Code to Example D for an example of how to perform this dwelling unit _____ calculation.

- a. service
- b. feeder
- c. both a & b
- d. none of the above

21. 314.15 All outlet box hood covers are required to be _____ for use in a wet location, not just extra duty outlet box hood covers installed in wet locations.

- a. approved
- b. identified
- c. marked

- d. listed
22. A new sentence was added at the end of 314.15 to permit approved drainage openings to be installed in the field in boxes or conduit bodies _____ for use in damp or wet locations in accordance with manufacturer's instructions.
- a. approved
 - b. identified
 - c. marked
 - d. listed
23. These weep holes cannot be larger than _____.
- a. 6 mm
 - b. 1/2 in.
 - c. both a & b
 - d. none of the above
24. 314.23(B) _____ can be supported from any structural member, not just from a structural member of a building.
- a. Enclosures
 - b. Cable trays
 - c. Appendixes
 - d. all of the above
25. 314.25 _____ screws are not permitted to be used to attach box covers or other equipment fastened to a box.
- a. Cover
 - b. Canopy
 - c. Drywall
 - d. all of the above
26. The title of 314.27(A)(1) was changed to " _____ " as not all vertical surfaces where luminaires or lampholders are mounted are necessarily in a wall.
- a. Wall Outlets
 - b. Vertical Surface Outlets
 - c. both a & b
 - d. none of the above

314.27(A)(2) Outlet boxes used to support ceiling-mounted luminaires that weigh more than 23 kg (50 lb.) are now required to be marked, on the interior of the box, with the maximum weight the box will support.

2011 NEC Requirement. Outlet boxes that support a ceiling-mounted luminaire or lampholder are required to be designed for that purpose. These boxes are required to support a luminaire weighing a minimum of 23 kg (50 lb.). In cases where a luminaire weighs more than 23 kg (50 lb.), the luminaire must be supported independently of the outlet box, unless the outlet box is listed and marked for the maximum weight to be supported.

2014 NEC Change. In situations where an outlet box is intended to support a luminaire weighing more than 23 kg (50 lb.), a revision to 314.27(A)(2) will now require a ceiling-mounted outlet box to be listed and marked, on the interior of the box, for the maximum weight other than 23 kg (50 lb.)] that the outlet box is designed to support. Otherwise, the luminaire must be supported independently of the outlet box.

324.41 Carpet squares that cover flat conductor cable (Type FCC) are required to be no larger than 1.0 m (39.37 in.) square.

2011 NEC Requirement. Floor-mounted flat conductor cable (Type FCC), their associated cable connectors, and insulating ends were permitted to be covered with standard-sized modular carpet squares. These carpet squares were not permitted to be larger than 914 mm (36 in.) square. Carpet squares that are adhered to the floor were required to be attached with release-type adhesives for access to the Type FCC cable after the initial installation.

2014 NEC Change. The maximum size modular carpet square permitted to cover floor-mounted flat conductor cable (Type FCC) has been increased to 1.0 m (39.37 in.) square. This will allow the use of standard-sized modular carpet products based on the International System of Units (SI units) of measure.

330.30(B) Type MC cable is permitted to be secured in intervals not exceeding 3 m (10 ft.) for vertical installations when listed and identified for such use.

2011 NEC Requirement. Metal-clad cable (Type MC) is generally required to be secured at intervals not exceeding 1.8 m (6 ft.) and is required to be secured within 300 mm (12 in.) of every box, cabinet, fitting, or other cable termination. No other securing provisions existed in the 2011 NEC for vertical installations.

2014 NEC Change. A new provision was added at the end of 330.30(B) to allow Type MC cable installed in vertical installations to be secured at intervals not exceeding 3 m (10 ft.) where listed and the Type MC cable contains ungrounded conductors 250 kcmil and larger.

330.30(D)(3) Type MC cable now is permitted to be installed unsupported in lengths not exceeding 900 mm (3 ft.) where necessary for vibration reasons or flexibility.

2011 NEC Requirement. Metal-clad cable (Type MC) is permitted to be unsupported where the cable is fished in concealed spaces in finished buildings or structures and supporting is impractical; or where the cable is not more than 1.8 m (6 ft.) in length from the last point of cable support to luminaires or other electrical equipment within an accessible ceiling. There were no provisions for Type MC cable concerning vibration or flexibility issues.

2014 NEC Change. A new provision was added at 330.30(D)(3) permitting Type MC cable to be unsupported where the cable is made of the interlocked armor type in lengths not exceeding 900 mm (3 ft.) from the last point of support. This would apply where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation.

334.40(B) Nonmetallic-sheathed cable interconnectors have been recognized to be used without a box and concealed where used for "repair wiring" rather than "rewiring" in existing buildings.

2011 NEC Requirement. Switch, outlet, and tap devices of insulating material were permitted to be used without boxes in exposed cable wiring and for rewiring in existing buildings where the cable is concealed and fished.

2014 NEC Change. This subsection was revised to address the specific types of devices that are permitted to be used without boxes. Listed self-contained switches and listed self-contained receptacles are the devices permitted in this application, not just any switch or outlet. Listed nonmetallic sheathed cable interconnector devices replaces the term tap devices to zero in on the specific type of device permitted in this application as well. The specific type of situation where this application minus a box is permitted to occur was limited to "repair wiring" rather than "rewiring" in existing buildings where the cable is concealed.

344.2 and 344.100 Definition of rigid metal conduit was revised by removing the last two existing sentences and relocating this permitted construction material text to a new 344.100, Construction.

2011 NEC Requirement. The definition of rigid metal conduit (RMC) had descriptive construction-type text at the end of the definition, which stated, "RMC is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous). Special use types are red brass and stainless steel." This language did not define RMC but rather gave examples of RMC.

2014 NEC Change. The definition of rigid metal conduit was revised by removing the last two previous sentences. CMP-8 relocated these sentences with permitted construction materials to a new 344.100 titled "Construction."

27. In situations where an outlet box is intended to support a luminaire weighing more than 23 kg (50 lb.), a revision to 314.27(A)(2) will now require a ceiling-mounted outlet box to be _____, on the interior of the box, for the maximum weight other than 23 kg (50 lb.) that the outlet box is designed to support.

- a. approved
- b. listed
- c. marked
- d. both b & c

28. Otherwise, the _____ must be supported independently of the outlet box.

- a. outlet
- b. box
- c. luminaire

- d. all of the above
- 29. The maximum size modular carpet square permitted to cover floor-mounted flat conductor cable (Type FCC) has been increased to _____ square. This will allow the use of standard-sized modular carpet products based on the International System of Units (SI units) of measure.
 - a. 10 m
 - b. 39.37 ft.
 - c. both a & b
 - d. none of the above
- 30. 330.30(B) Type MC cable is permitted to be secured in intervals not exceeding 3 m (10 ft.) for vertical installations when _____ for such use.
 - a. approved
 - b. listed
 - c. identified
 - d. both b & c
- 31. 330.30(D)(3) Type MC cable now is permitted to be installed unsupported in lengths not exceeding 900 mm (3 ft.) where necessary for _____.
 - a. vibration reasons
 - b. flexibility
 - c. stability
 - d. both a & b
- 32. 334.40(B) Nonmetallic-sheathed cable interconnectors have been recognized to be used without a box and concealed where used for _____ in existing buildings.
 - a. repair wiring
 - b. rewiring
 - c. upgrades
 - d. all of the above
- 33. 344.2 and 344.100 Definition of rigid metal conduit was _____ by removing the last two existing sentences and relocating this permitted construction material text to a new 344.100, Construction.
 - a. deleted
 - b. revised
 - c. added
 - d. moved

348.30(A) Ex. No. 4 Revision to Exception No. 4 for "Securely Fastened" clarifies that listed flexible metal conduit fittings are permitted as a support means for the purpose of applying this exception.

2011 NEC Requirement. Flexible metal conduit (FMC) is typically required to be securely fastened in place within 300 mm (12 in.) of each box, cabinet, conduit body, etc., and to be supported and secured at intervals not to exceed 1.4 m (4 1/2 ft.). Four exceptions exist for this rule, with one of these exceptions permitting lengths not exceeding 1.8 m (6 ft.) from the last point where the FMC is securely fastened for connections within an accessible ceiling to luminaire(s) or other equipment.

2014 NEC Change. A revision to Exception No. 4 for 348.30(A) was added to clarify that a flexible metal conduit fitting qualifies as the "last point of support" or as a support means at the luminaire for the purpose of applying Exception No. 4.

350.42 Only fittings listed for use with LFMC shall be used with LFMC. Straight LFMC fittings are permitted for direct burial where marked.

2011 NEC Requirement. The one and only provision at 350.42 stated that angle connectors used with liquid-tight flexible metal conduit (LFMC) could not be installed or used where concealed.

2014 NEC Change. Two new provisions were put in place at 350.42. A new requirement was added to prohibit any type of fitting other than a fitting listed for use with LFMC from being used with LFMC. The second provision addresses straight fittings for LFMC. These straight fittings are permitted for direct burial, but only those straight fitting marked to indicate they have been identified for direct burial.

356.12 Deletion of previous 356.12(4) will no longer limit LFNC to 600 volts and below applications.

2011 NEC Requirement. The use of liquidtight flexible nonmetallic conduit (LFNC) is limited to areas where the wiring method will not be subject to physical damage. LFNC is prohibited where ambient and/or conductor temperatures are in excess of that for which the LFNC is approved. LFNC is generally limited to lengths not longer than 1.8 m (6 ft.); and, in general, LFNC is also prohibited in any hazardous (classified) location. For the 2011 NEC, LFNC was prohibited in installations where the operating voltage of the contained conductors was in excess of 600 volts, nominal, except as permitted in 600.32{A) for a sign application.

2014 NEC Change. Previous item (4) at 356.12 for "Uses Not Permitted" for LFNC has been deleted. This will allow LFNC as an acceptable wiring method for applications where the voltage involved is greater than 600 volts.

Article 370, Cablebus, was reorganized to more closely follow the Chapter3 parallel numbering system format.

2011 NEC Requirement. The requirements for cablebus are found in Article 370 of the NEC. Refer to the 2011 NEC for complete text and article structure.

2014 NEC Change. Article 370 was restructured. See NEC for complete text and article structure.

376.22(B) Ampacity adjustment factors for more than three current-carrying conductors in a raceway shall only apply to metal wireways where the number of current-carrying conductors exceeds 30 at any cross section of the wireway.

2011 NEC Requirement. The ampacity adjustment factors of 310.15(B)(3)(a), More Than Three Current-Carrying Conductors in a Raceway or Cable, are applicable to metal wireway under certain conditions. These adjustment factors applied only where the number of current-carrying conductors, including current-carrying neutral conductors, exceeded 30. For this application, signaling and control conductors are not considered current-carrying conductors.

2014 NEC Change. The "30 current-carrying conductors" in question were identified as 30 current-carrying conductors at any cross section of the wireway – not just 30 or more current-carrying conductors total in the wireway.

376.56(B)(1) and (B)(5) Power distribution blocks installed in wireways ahead of the service main (line side) must be listed for the purpose. Also, conductors in wireways are required to be arranged so that power distribution block terminals are unobstructed after their installation.

2011 NEC Requirement. Power distribution blocks (PDB) are permitted to be installed in metal wireways, provided the PDBs are listed for same. In addition to the wiring space required for splices and taps, wireways containing PDBs must meet the dimensions specified in the installation instructions of the PDBs. Sufficient wire bending space is required at the terminals of PDBs as specified at 312.6(B) for wire-bending space at terminals of cabinets, cutout boxes, and meter socket enclosures. PDBs cannot have uninsulated live parts exposed within a wireway., with or without the wireway cover installed. Clear plastic covers provided by the manufacturer of the PDBs typically can meet this last requirement.

2014 NEC Change. In addition to the requirements for power distribution blocks (PDB) required in the 2011 NEC, two new provisions were added to these requirements. A new sentence was added to item (1) requiring PDBs installed ahead of the service main (line side) to be listed for the purpose. The second change occurred by adding a new 376.56(B)(5) which requires PDBs installed in metal wireways to have all conductors arranged so that PDB terminals remain accessible and unobstructed after installation.

34. A revision to Exception No. 4 for 348.30(A) was _____ to clarify that a flexible metal conduit fitting qualifies as the "last point of support" or as a support means at the luminaire for the purpose of applying Exception No. 4.

- a. deleted
- b. revised
- c. added
- d. moved

35. 350.42 Only fittings _____ for use with LFMC shall be used with LFMC.

- a. approved
- b. identified

- c. marked
 - d. listed
36. _____ LFMC fittings are permitted for direct burial where marked.
- a. Angle
 - b. Straight
 - c. both a & b
 - d. none of the above
37. 356.12 Deletion of previous 356.12(4) will no longer limit LFNC to _____ volts and below applications.
- a. 600
 - b. 240
 - c. 800
 - d. 1000
38. Article 370, Cablebus, was _____ to more closely follow the Chapter3 parallel numbering system format.
- a. reorganized
 - b. revised
 - c. added
 - d. moved
39. 376.22(B) Ampacity adjustment factors for more than three current-carrying conductors in a raceway shall only apply to metal wireways where the number of current-carrying conductors exceeds ____ at any cross section of the wireway.
- a. 3
 - b. 10
 - c. 20
 - d. 30
40. 76.56(B)(1) and (B)(5) Power distribution blocks installed in wireways ahead of the service main (line side) must be _____ for the purpose.
- a. approved
 - b. identified
 - c. marked
 - d. listed

386.120 Surface metal raceways are now required to have each length identified and marked according to 110.21 (A) manufacturer's marking requirements.

2011 NEC Requirement. No marking requirements existed in Article 386 for surface metal raceways.

2014 NEC Change. A new section entitled "Marking" was added to Article 386 requiring each length of surface metal raceway to be identified and to be marked in accordance with the first part of 110.21 (A) for manufacturer's marking requirements.

Table 392.10(A) was revised to reflect and clarify the permitted wiring methods that can be used in cable trays.

2011 NEC Requirement. The wiring methods permitted to be used in a cable tray are identified at Table 392.10(A). There were 32 types of wiring methods listed in this table that are permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

2014 NEC Change. Revisions were made to Table 392.10(A) with no substantial technical changes. The changes were more editorial in nature to properly identify the permitted wiring methods that can be supported by a cable tray. The common wiring method abbreviations were added to the end of the wiring methods where appropriate.

392.18(H) and Exception. The marking requirement for cable trays containing conductors rated over 600 volts has been relaxed for industrial establishments with maintenance, supervision, and qualified persons servicing the installation.

2011 NEC Requirement. The installation requirements for cable trays are covered at 392.18. For the 2011 NEC, marking requirements were added to 392.18 for cable trays. This warning label is required when the cable tray contains conductors rated over 600 volts. This label or notice must to be permanent and legible with the

phrase "DANGER-HIGH VOLTAGE-KEEP AWAY" located in a readily visible location. These warning labels are required to be located at least every 3 m (10 ft.).

2014 NEC Change. An exception was added for the marking requirements of 392.18(H). In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, cable tray system warning labels are not required for the installation of cable trays containing conductors rated over 600 volts where the cable tray is not accessible (as applied to equipment). A tag line was added at the end of the main rule at 392.18(H) directing installers to the new warning and danger label requirements at 10.21(13). The remainder of the 392.18 installation requirements for cable trays remained the same.

392.20(A) and (B) Cables installed in cable trays will be based upon the operating voltage and not the cable rating.

2011 NEC Requirement. Cables rated 600 volts or less were permitted to be installed in the same cable tray as cables rated over 600 volts. However, cables rated over 600 volts had to meet one of two options. One was that the cables rated over 600 volts had to be of Type MC construction. The second was that cables rated over 600 volts had to be separated from the cables rated 600 volts or less by a solid fixed barrier within the cable tray.

2014 NEC Change. The word "rated" was replaced with the words "operating at" eight times within these two subsections. These revisions clarify that cables installed in cable trays should be based upon the operating voltage rather than the actual rating of the cable.

Article 393 Low-Voltage Suspended Ceiling Power Distribution Systems.

2011 NEC Requirement. This subject matter was not addressed in the 2011 NEC.

2014 NEC Change. A new article entitled "Low-Voltage Suspended Ceiling Power Distribution Systems" was added to address low-voltage Class 2 supplied equipment (lighting and power) connected to ceiling grids, floors and walls built for this purpose. This article addresses equipment with similar characteristics to track lighting but includes the wiring and power supply requirements. This type of low-voltage suspended ceiling power distribution system is defined as "a system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply."

399.2 The definition of outdoor overhead conductors was revised to include the words "in free air" to ensure that the definition clearly indicated that wiring installed under the scope of Article 399 was not installed in raceways, etc.

2011 NEC Requirement. The definition of an over-600-volt outdoor overhead conductor as it applied to Article 399 was "single conductors, insulated, covered, or bare, installed outdoors on support structures."

2014 NEC Change. The words "in free air" were added to the definition of outdoor overhead conductors as applied to Article 399, which now involves outdoor overhead conductors rated over 1000 volts due to the global changes pertaining to the 1000 volts parameter in the 2014 NEC

41. 386.120 Surface metal raceways are now required to have each length _____ according to 110.21 (A)

- a. identified
- b. marked
- c. approved
- d. both a & b

42. Table 392.10(A) was ____ to reflect and clarify the permitted wiring methods that can be used in cable trays.

- a. deleted
- b. revised
- c. added
- d. moved

43. 392.18(H) and Exception. The marking requirement for cable trays containing conductors rated over 600 volts has been relaxed for industrial establishments with _____.

- a. maintenance
- b. supervision

- c. qualified persons servicing the installation
 - d. all of the above
44. 392.20(A) and (B) Cables installed in cable trays will be based upon the _____.
- a. operating voltage
 - b. cable rating
 - c. both a & b
 - d. none of the above
45. A new article entitled "Low-Voltage Suspended Ceiling Power Distribution Systems" was _____ to address low-voltage Class 2 supplied equipment (lighting and power) connected to ceiling grids, floors and walls built for this purpose.
- a. deleted
 - b. revised
 - c. added
 - d. moved
46. 399.2 The definition of outdoor overhead conductors was _____ to include the words "in free air" to ensure that the definition clearly indicated that wiring installed under the scope of Article 399 was not installed in raceways, etc.
- a. deleted
 - b. revised
 - c. moved
 - d. none of the above

400.4 The use of flexible cords and flexible cables not described in Table 400.4 requires the permission of the AHJ.

2011 NEC Requirement. The use of flexible cords and flexible cables was limited to those identified by Table 400.4. Any flexible cord or cable, other than those listed in the table, was to be the "subject of special investigation."

2014 NEC Change. A revision to 400.4 relaxed the rule for the use of flexible cords and flexible cables, other than those in Table 400.4, to require "permission by the authority having jurisdiction" rather than requiring these flexible cords and cables to be the "subject of special investigation."

400.5 Temperature correction factors apply to ampacity values for flexible cords and cables in both Table 400.5(A)(1) and Table 400.5(A)(2).

2011 NEC Requirement. Provisions at 400.5(A) in the 2011 NEC indicated that where flexible cords are used in ambient temperatures other than 30° C (86° F), the temperature correction factors from Table 310.15(B)(2)(a) that correspond to the temperature rating of the flexible cord are to be applied to the ampacity values in Table 400.5(A)(2).

2014 NEC Change. Revisions to 400.5(A) clarified that where flexible cords and cables are used in ambient temperatures other than 30° C (86° F), the temperature correction factors from Table 310.15(B)(2)(a) that correspond to the temperature rating of the flexible cord and cables shall be applied to the ampacity values in both Table 400.5(A)(1) and Table 400.5(A)(2).

400.6(A) Standard marking requirements for flexible cords and cables are now required to include the maximum operating temperature of the flexible cord or cable.

2011 NEC Requirement. Flexible cords and cables are required to be marked by means of a printed tag attached to the coil reel or carton. This tag is required to identify the maximum rated voltage, the proper type letter or letters for the type of wire or cable involved the manufacturer's name, trademark, or other distinctive marking, where the neutral conductor is smaller than the ungrounded conductors, and the AWG size or circular mil area. For most flexible cords or cables, the cord or cable is required to be durably marked on the surface at intervals not exceeding 610 mm (24 in.) with the type letter designation, size, and number of conductors.

2014 NEC Change. In addition to the standard marking requirements required in the previous Code, a new requirement was added to require flexible cords and cables or their associated tags to also include the maximum operating temperature of the flexible cord or cable.

400.7(A)(11) A flexible cord between an existing receptacle outlet and an inlet, where the inlet provides power to an additional single receptacle outlet as a listed assembly is now permitted.

2011 NEC Requirement. Flexible cords and cables are permitted to be used with or for pendants, wiring of luminaires, connection of portable luminaires, portable and mobile signs, or appliances, elevator cables, wiring of cranes and hoists, connection of utilization equipment to facilitate frequent interchange, prevention of the transmission of noise or vibration, appliances where designed to permit ready removal and the appliance is intended or identified for flexible cord connection, connection of moving parts, and where specifically permitted elsewhere in the Code.

2014 NEC Change. In addition to the uses permitted in the previous edition of the Code, a new provision was added allowing a flexible cord to be used between an existing receptacle outlet and an inlet, where the inlet provides power to an additional single receptacle outlet. Part of this new allowance requires the wiring interconnecting the inlet to the single receptacle outlet to be a Chapter 3 wiring method. The inlet, receptacle outlet, and Chapter 3 wiring method, including the flexible cord and fittings, must be a "listed assembly" specific for this application.

404.2(C) Requirements and exceptions for the grounded conductor at switching locations have been revised into positive text and rearranged into a list format.

2011 NEC Requirement. A grounded conductor was required at every switch location where switches control lighting loads supplied by a grounded general purpose branch circuit. This main rule had an exception with two specific conditions. The first exception permitted the grounded circuit conductor to be omitted from the switch enclosure where the wiring method employed was raceway systems that allow the grounded conductor to be added to the switch location at a later date, when and if needed. The raceway had to be of sufficient cross sectional area to accommodate the addition of the grounded circuit conductor of the lighting circuit to the switch location. The other exception dealt with cable assemblies entering the switch box through a framing cavity that was open at the top or bottom on the same floor level, or through a wall, floor, or ceiling that is unfinished on one side.

2014 NEC Change. This subsection and the exception were revised to incorporate the exception (with two conditions) into positive text and to arrange the conditions to which a grounded conductor would not be required at the switch location into a simpler-to-use list format. Five new conditions were added along with two existing conditions described in the previous exception.

404.8(C) Multipole snap switches that are rated not less than the system voltage (whether listed for multiple circuits or not) are no longer permitted to be fed from more than a single circuit.

2011 NEC Requirement. Multipole, general-use snap switches are not permitted to be fed from more than a single circuit unless listed and marked as a two-circuit or three-circuit switch. For the 2011 NEC, multipole snap switches rated not less than the system voltage were permitted to be fed from more than a single circuit.

2014 NEC Change. A multipole snap switch rated not less than the system voltage being allowed to be fed from more than a single circuit has been removed from the Code. Multipole, general-use snap switches listed and marked as a two-circuit or three-circuit switch are still permitted to be fed from more than a single circuit.

47. A revision to 400.4 relaxed the rule for the use of flexible cords and flexible cables, other than those in Table 400.4, to require _____.

- a. permission by the authority having jurisdiction
- b. the subject of special investigation
- c. both a & b
- d. none of the above

48. 400.5 Temperature correction factors apply to ampacity values for flexible _____ in both Table 400.5(A)(1) and Table 400.5(A)(2).

- a. cords
- b. cables
- c. both a & b
- d. none of the above

49. 400.6(A) Standard marking requirements for flexible cords and cables are now required to include the maximum operating _____ of the flexible cord or cable.
- a. draw
 - b. voltage
 - c. amperage
 - d. temperature
50. 400.7(A)(11) A flexible cord between an existing receptacle outlet and an inlet, where the _____ provides power to an additional single receptacle outlet as a listed assembly is now permitted.
- a. outlet
 - b. inlet
 - c. both a & b
 - d. none of the above
51. 404.2(C) This subsection and the exception were revised to incorporate the exception (with two conditions) into positive text and to arrange the conditions to which a grounded conductor would _____ required at the switch location into a simpler-to-use list format.
- a. not be
 - b. be
 - c. could be
 - d. all of the above
52. 404.8(C) A multipole snap switch rated _____ the system voltage being allowed to be fed from more than a single circuit has been removed from the Code.
- a. not less than
 - b. less than
 - c. both a & b
 - d. none of the above
53. 404.8(C) Multipole, general-use snap switches _____ as a two-circuit or three-circuit switch are still permitted to be fed from more than a single circuit.
- a. listed
 - b. marked
 - c. both a & b
 - d. none of the above

406.3(E) and Figure 406.3 (E) A new marking symbol for receptacle outlets controlled by an automatic control device or by an automatic energy management system. New requirement includes new Figure 406.3(E).

2011 NEC Requirement. Marking requirements for receptacles controlled by an automatic control device or by an automatic energy management system were not addressed in the 2011 NEC.

2014 NEC Change. A new subdivision entitled "Controlled Receptacle Marking" was added to 406.3, Receptacle Rating and Type. This subsection will require a new marking symbol for receptacle outlets controlled by an automatic control device or by an automatic energy management system. The new symbol was displayed in Figure 406.3(E). An exception follows this rule to indicate that this marking is not required for receptacle outlets controlled by a wall switch to provide the required room lighting outlet(s) as permitted by 210.70(A)(1)Ex. No. 1.

406.4(D) AFCI- and GFCI-type replacement receptacles are required to be installed in a readily accessible location.

2011 NEC Requirement. When an existing receptacle is replaced, grounding-type receptacles are required to be used where a grounding means exists in the receptacle enclosure. Where an equipment grounding conductor does not exist in the receptacle enclosure, three options are available: (1) a non-grounding-type receptacle is permitted to be replaced with another non-grounding-type receptacle; (2) a non-grounding type receptacle(s) is permitted to be replaced with a CFCI-type of receptacle; or (3) a non-grounding-type receptacle is permitted to be replaced with a grounding-type receptacle where supplied through a GFCI.

GFCI-protected receptacles are required where replacements are made at receptacle outlets that are required to be so protected elsewhere in the Code. Where a receptacle outlet is supplied by a branch circuit that requires AFCI protection as specified elsewhere in the Code, a replacement receptacle at this outlet must be provided

with AFCI protection. Listed tamper-resistant receptacles and weather resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be tamper-resistant or weather-resistant elsewhere in this Code.

2014 NEC Change. In addition to the replacement receptacle requirements of the previous edition of the Code, a new sentence was added to the main text at 406.4(D) to require arc-fault circuit-interrupter (AFCI) and ground-fault circuit-interrupter (GFCI) type replacement receptacles to be installed in a readily accessible location.

406.5 (E) Restrictions to prohibit receptacles from being installed in the face-up position expanded to all occupancies, not just dwelling units. Listed receptacle assemblies for countertop applications have been recognized for this application as well.

2011 NEC Requirement. Receptacles were prohibited from being installed in a face-up position in countertops or similar work surfaces, but this prohibition applied to dwelling units only.

2014 NEC Change. The words "in Dwelling Units" were removed from the title of 406.5(E) to make it clear that receptacles cannot be installed in a face-up position in countertops or similar work surfaces of any type occupancy, not just dwelling units. Language was added to recognize listed receptacle assemblies for countertop applications.

406.5 (F) New provisions were added which prohibit receptacles from being installed in a face-up position in seating areas or similar surfaces unless they are part of an assembly listed for the application.

2011 NEC Requirement. No provisions existed in the 2011 NEC dealing with or prohibiting receptacles from being mounted in seating areas or similar surfaces.

2014 NEC Change. A new subdivision (F) Receptacles in Seating Areas and Other Similar Surfaces was added to 406.5 to prohibit receptacles from being installed in a face-up position in seating areas or similar surfaces unless they are part of an assembly listed for the application.

406.9 (B)(1) Extra duty covers are now required for all 15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location (not just for those supported from grade). This requirement also includes dwelling unit wet location receptacles as well.

2011 NEC Requirement. All 15- and 20-ampere, 125- and 250-volt receptacles installed in wet locations are required to have an enclosure and cover that are weatherproof whether a cord cap is inserted or not. An outlet box hood cover installed for this purpose must be listed, and where installed on an enclosure supported from grade, this outlet box hood cover had to be identified as an "extraduty" type cover. This extra duty hood cover did not apply to dwelling unit receptacles in the 2011 NEC. All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles installed in wet locations must also be of the listed weather-resistant type.

2014 NEC Change. All 15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location still must have an enclosure and covers that are weatherproof whether an attachment plug cap is inserted or not. A revision now requires all enclosures and covers installed in wet locations for 15- and 20-ampere, 125- and 250-volt receptacles to be listed and of the "extra duty" type, not just boxes supported from grade. This requirement is now also required at dwelling units as well. The requirement for weather-resistant type receptacles in wet locations is still applicable in the 2014 NBC.

406.12 Exception for tamper-resistant receptacles at dwelling units has been expanded to guest rooms and guest suites of hotels and motels and to child care facilities.

2011 NEC Requirement. In all areas specified in 210.52 (which are the majority of the areas of a dwelling unit), all nonlocking-type 125-volt, 15- and 20-ampere receptacles are required to be listed tamper-resistant receptacles with an exception for four specific locations or areas. Dwelling unit receptacles exempted from the tamper-resistant receptacle requirement are those located more than 1.7 m (5 1/2 ft.) above the floor, receptacles that are part of a luminaire or appliance, receptacles located in a dedicated appliance space, and non-grounding-type replacement receptacles. All nonlocking-type 125-volt, 15- and 20-ampere receptacles located in guest rooms and guest suites of hotels and motels and in child care facilities were required to be listed tamper-resistant receptacles.

2014 NEC Change. The exception for tamper-resistant receptacles with four specific locations or areas that applied only to dwelling units in the 2011 NEC, now applies to dwelling units, guest rooms and guest suites of hotels and motels, and to child care facilities.

54. 406.3(E) and Figure 406.3 (E) A new marking symbol for receptacle outlets controlled by an _____. New requirement includes new Figure 406.3(E).
- automatic control device
 - an automatic energy management system
 - both a & b
 - none of the above
55. 406.4(D) AFCI- and GFCI-type replacement receptacles are required to be installed in a _____ location.
- accessible
 - readily accessible
 - appropriate
 - all of the above
56. 406.5 (E) Restrictions to prohibit receptacles from being installed in the face-up position expanded to ____.
- all occupancies
 - just dwelling units
 - both a & b
 - none of the above
57. 406.5 (F) New provisions were added which prohibit receptacles from being installed in a face-up position in seating areas or similar surfaces unless they are part of an assembly _____ for the application.
- marked
 - approved
 - identified
 - listed
58. 406.9 (B)(1) Extra duty covers are now required for all 15- and 20-ampere, 125- and 250-volt receptacles installed in a ____ location (not just for those supported from grade).
- damp
 - wet
 - submerged
 - all of the above
59. 406.9 (B)(1) This requirement also includes dwelling unit _____ location receptacles as well.
- damp
 - wet
 - submerged
 - all of the above
60. 406.12 Exception for tamperresistant receptacles at dwelling units has been expanded to_____.
- guest rooms
 - guest suites of hotels and motels
 - child care facilities
 - all of the above

406.15 Dimmer-controlled receptacles are now permitted for a plug/receptacle combination in listed nonstandard configuration types.

2011 NEC Requirement. Dimmer switches are generally to be used only to control permanently installed incandescent luminaires unless listed for the control of other loads and installed accordingly. Dimmer switches are generally not permitted to control receptacle outlets. This provision appears at 404.14(E). There was no language in Article 406 dealing with dimmer-controlled receptacles in the 2011 NEC.

2014 NEC Change. A new section was added at 406.15 to permit specific receptacles to be controlled by a dimmer under specific conditions. A receptacle supplying lighting loads can be connected to a dimmer if the plug/receptacle combination is a nonstandard configuration type and is specifically listed and identified for each such unique combination.

Article 408 and 408.1 The title of Article 408 was changed to "Switchboards, Switchgear, and Panelboards," and the scope of Article 408 was revised to reflect this revision.

2011 NEC Requirement. Article 408 covered requirements for switchboards and panelboards operating at 600 volts or less. There was a definition of metal-enclosed power switchgear at Article 100, and this term was used intermittently throughout Article 408.

2014 NEC Change. The title of Article 408 was changed to "Switchboards, Switchgear, and Panelboards," and the scope of Article 408 was revised to reflect this revision. The definition of metal-enclosed power switchgear in Article 100 was revised and changed to switchgear. Wherever the term metal-enclosed power switchgear was used in Article 408, it was replaced with switchgear. The voltage limitation of 600 volts was replaced with 1000 volts in the scope and throughout the article to reflect the code-wide revision in this direction.

408.3 (E) A new "DC Bus Arrangement" was added for dc ungrounded buses.

2011 NEC Requirement. Section 408.3(E) addressed the bus or phase arrangement for ac systems only. There were no provisions for the bus arrangement for dc systems in the 2011 NEC. The general phase arrangement requirement for an ac 3-phase bus system is phases A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the switchboard or panelboard. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta connected systems.

2014 NEC Change. Provisions were added addressing dc bus arrangements. Ungrounded dc buses are permitted to be in any order. Arrangement of dc buses is to be field marked as to polarity, grounding system, and nominal voltage

408.4(B) A revision was added to indicate that switchboards, switchgear, and panelboards can have more than one source of power.

2011 NEC Requirement. A new provision was added to the 2011 NEC to indicate that all switchboards and panelboards supplied by a feeder in other than one- or two-family dwellings shall be marked to indicate the device or equipment where the power supply originates. This language indicated (whether intended or not) that switchboards and panelboards could have only one source of power.

2014 NEC Change. The text at 408.4(B) was revised to add plural language such as "feeder(s)" to clarify that all switchboards, switchgear, and panelboards can have more than one source of power.

408.55 Section 408.55 was reorganized into a list format of types of bending spaces. Wire-bending space for rear entry, with a removable cover on the opposite wall of enclosure, is incorporated as well.

2011 NEC Requirement. The enclosures for a panelboards are required to have top and bottom wirebending space sized in accordance with Table 312.6(B)(conductors entering or leaving opposite walls) for the largest conductor entering or leaving the enclosure.

Side wire-bending space is to be in accordance with Table 312.6(A) (conductors not entering or leaving opposite walls) for the largest conductor to be terminated in that space.

An example of these table requirements would be a 1/0 copper conductor with one wire per terminal would need 88.9 mm (3 5/8 in.) of wire-bending space in accordance with Table 312.6(A), whereas the same 1/0 copper conductor with one wire per terminal would need 140 mm (5 1/2 in.) of wirebending space in accordance with Table 312.6(B).

Four exceptions exist for top and bottom wire-bending spaces. The first two exceptions permit either the top or bottom wire-bending space to be sized in accordance with Table 312.6(A) for a panelboard rated 225 amperes or less and designed to contain not over 42 overcurrent devices or where at least one side wire-bending space is sized in accordance with Table 312.6(B) for the largest conductor to be terminated in any side wire-bending space.

The third exception permits both the top and bottom wire-bonding spaces to be sized in accordance with Table 312.6(A) if the panelboard is designed and constructed for wiring using only a single 90-degree bend for each conductor and the wiring diagram shows and specifies the method of wiring that is to be used.

The fourth exception permits either the top or the bottom wire-bending space, but not both, to be sized in accordance with Table 312.6(A) where there are no conductors terminated in that space.

2014 NEC Change. This section was reorganized into a list format for clarity. Besides the existing provisions for top, bottom, and side wire-bending spaces, provisions were added for "Back Wire-Bending Space." This new

subsection (C) now addresses wirebending space for rear entry with a removable cover on the opposite wall of the enclosure with the distance from that wall to the cover complying with the distance required for one wire per terminal in Table 312.6(A). The distance between the center of the rear entry and the nearest termination for the entering conductors cannot be less than the distance given in Table 312.6(B).

409.20 All heating loads – not just resistance heating loads – are required to be calculated when sizing the conductors which supply industrial control panels.

2011 NEC Requirement. Industrial control panel supply conductors were required to have an ampacity not less than 125 percent of the full-load current rating of all resistance heating loads plus 125 percent of the full-load current rating of the highest rated motor plus the sum of the full-load current ratings of all other connected motors and apparatus. This was to be based on the duty cycle of the motors and apparatus that may be in operation at the same time.

2014 NEC Change. A revision to 409.20 removed the word, "resistance" to indicate that all heating loads were to be included in the ampacity equation for industrial control panels, not just resistance heating loads.

61. 406.15 Dimmer-controlled receptacles are now permitted for a plug/receptacle combination in listed _____ configuration types.

- a. typical
- b. nonstandard
- c. normal
- d. none of the above

62. Article 408 and 408.1 The title of Article 408 was changed to " _____ " and the scope of Article 408 was revised to reflect this revision.

- a. Switchboards
- b. Switchgear
- c. Panelboards
- d. all of the above

63. 408.3 (E) A new "DC Bus Arrangement" was added for dc _____ buses.

- a. bonded
- b. unbonded
- c. grounded
- d. ungrounded

64. 408.4(B) A revision was added to indicate that switchboards, switchgear, and panelboards can have _____ source of power.

- a. more than one
- b. only one
- c. only up to two
- d. all of the above

65. 408.55 Section 408.55 was reorganized into a list format of types of bending spaces. Wire-bending space for _____ entry, with a removable cover on the opposite wall of enclosure, is incorporated as well.

- a. side
- b. front
- c. top
- d. rear

66. A revision to 409.20 removed the word, "resistance" to indicate that all heating loads were to be included in the ampacity equation for _____.

- a. industrial control panels
- b. resistance heating loads
- c. both a & b
- d. none of the above

410.6 Listing requirements for luminaires and lampholders have been expanded to retrofit kits.

2011 NEC Requirement. All luminaires and lampholders are required be listed.

2014 NEC Change. Listing requirements in Article 410 were expanded to include retrofit kits as well as luminaires and lampholders.

410.10(F) Luminaires are no longer permitted to be installed within 38 mm (1 1/2 in.) of the lowest metal deck surface.

2011 NEC Requirement. A cable, raceway, or box installed under metal-corrugated sheet roof decking is required to be installed and supported so there is not less than 38 mm (1 1/2 in.) measured from the lowest surface of the roof decking to the top of the cable, raceway, or box. A cable, raceway, or box is prohibited from being installed in concealed locations in metal-corrugated sheet decking-type roofing. These provisions are covered at 300.4(E). For the 2011 NEC, there were no similar metal-corrugated roof decking prohibitions for luminaires.

2014 NEC Change. A new subsection (F) Luminaires Installed In or Under Roof Decking was added at 410.10 that will forbid luminaires from being installed within 38 mm (1 1/2 in.) of the lowest metal roof decking surface.

410.130(G)(1)Ex. No 4 Exception 4 has been deleted. This exception stated that disconnecting means were not required in industrial establishments that had limited public access and qualified personnel who serviced by written procedures.

2011 NEC Requirement. The parent text at 410.130(G)(1) requires fluorescent luminaires that utilize double-ended lamps and contain ballast(s) to have a local disconnecting means either internal or external to each luminaire. This would also include existing installed luminaires without disconnecting means, at the time ballast is replaced. This provision does not pertain to dwelling unit luminaires. Five exceptions existed for local disconnecting means requirement. This local disconnecting means is not required for luminaires installed in hazardous (classified) location(s), for emergency illumination, or for industrial establishments with qualified service personnel. An accessible cord from a cord and plug-connected luminaire can serve as the disconnecting means. Snap switches can serve as the local disconnecting means when these switches are designed such that the illuminated space cannot be left in total darkness.

2014 NEC Change. Exception No. 4 to 410.130(G)(1) has been deleted. This exception dealt with industrial establishments with restricted public access where conditions of maintenance and supervision ensure that only qualified persons service the installation by written procedures. These industrial areas will no longer be exempted from a local disconnecting means at indoor fluorescent luminaires (employing a ballast).

422.5 GFCI devices providing protection to appliances in Article 422 are required to be installed in readily accessible locations.

2011 NEC Requirement. GFCI devices installed to meet the requirements of 210.8 are required to be installed in a readily accessible location. This "readily accessible" location provision did not exist in Article 422 for appliances in the 2011 NEC.

2014 NEC Change. A new section 422.5 has been added to require all devices providing GFCI protection for appliances to be installed in a readily accessible location.

422.11(F)(3) Resistance-type immersion electric heating elements for low-pressure water heater tanks or open-outlet water heater vessels are permitted to be subdivided into 120-amperes circuits and protected at not more than 150 amperes.

2011 NEC Requirement. Overcurrent protection of appliances is covered at 422.11. Electric heating appliances employing resistance-type heating elements rated more than 48 amperes, generally are required to have their heating elements subdivided. Each subdivided load cannot exceed 48 amperes and must be protected at not more than 60 amperes. Water heaters and steam boilers employing resistance-type immersion electric heating elements contained in an American Society of Mechanical Engineers (ASME)-rated and stamped vessel or listed instantaneous water heaters are permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes.

2014 NEC Change. For the 2014 NEC, 422.11 (F)(3) was revised into a list format and low-pressure water heater tanks or open-outlet water heater vessels were added to this provision. This revision will now allow low-pressure water heater tanks or open-outlet water heater vessels to be subdivided into 120-ampere circuits instead of the 48 amperes restriction in the parent text of 422.11 (F).

422.23 GFCI protection is now required for all tire inflation and automotive vacuum machines provided for public use.

2011 NEC Requirement. There was no provision in the 2011 NEC requiring GFCI protection for tire inflation and automotive vacuum machines.

2014 NEC Change. A new section 422.33 was added to require ground-fault circuit-interrupter (GFCI) protection for all tire inflation machines and automotive vacuum machines provided for public use.

67. 410.06 Listing requirements in Article 410 were expanded to include _____.

- a. retrofit kits
- b. luminaires
- c. lampholders
- d. all of the above

68. A new subsection (F) Luminaires Installed In or Under Roof Decking was added at 410.10 that will forbid luminaires from being installed within _____ of the lowest metal roof decking surface.

- a. 38 mm
- b. 1 1/2 in.
- c. both a & b
- d. none of the above

69. 410.130(G)(1)Ex. No 4 Exception 4 has been _____. This exception stated that disconnecting means were not required in industrial establishments that had limited public access and qualified personnel who serviced by written procedures.

- a. added
- b. deleted
- c. moved
- d. revised

70. 422.5 GFCI devices providing protection to appliances in Article 422 are required to be installed in _____ locations.

- a. convenient
- b. accessible
- c. readily accessible
- d. all of the above

71. 422.11(F)(3) Resistance-type immersion electric heating elements for low-pressure water heater tanks or open-outlet water heater vessels are permitted to be subdivided into _____ circuits.

- a. 120-volt
- b. 120-amperes
- c. 120-volt-amperes
- d. all of the above

72. 422.11(F)(3) Resistance-type immersion electric heating elements for low-pressure water heater tanks or open-outlet water heater vessels are permitted to be protected at not more than _____.

- a. 150 amperes
- b. 150 volt-amperes
- c. 120 amperes
- d. none of the above

73. A new section 422.33 was added to require ground-fault circuit-interrupter (GFCI) protection for _____ provided for public use.

- a. tire inflation machines
- b. automotive vacuum machines
- c. both a & b
- d. none of the above

422.49 GFCI protection in the cord or the plug of high pressure spray washing machines was expanded to three-phase equipment rated 208Y/120 volts and 60 amperes or less.

2011 NEC Requirement. All single-phase cord- and plug-connected high-pressure spray washing machines rated at 250 volts or less are required to be provided with factory-installed ground-fault circuit-interrupter (GFCI) protection for personnel. The GFCI for this purpose is also required to be an integral part of the attachment plug or it must be located in the supply cord within 300 mm (12 in.) of the attachment plug.

2014 NEC Change. The requirement for cord- and plug-connected high-pressure spray washing machines to be provided with factory-installed GFCI protection for personnel was expanded to three-phase equipment rated 208Y/120 volts and 60 amperes or less, as well as to single-phase equipment rated 250 volts or less.

422.51 GFCI protection has been expanded to hard-wired vending machines as well as to cord- and plug-connected vending machines.

2011 NEC Requirement. Cord- and plug-connected vending machines are required to be provided with a ground-fault circuit interrupter (GFCI) as an integral part of the attachment plug or to be located within 300 mm (12 in.) of the attachment plug. This GFCI requirement applies to vending machines manufactured or remanufactured on or after January 1, 2005. Older vending machines manufactured or remanufactured prior to January 1, 2005, are required to be connected to a GFCI-protected outlet.

2014 NEC Change. The requirement for GFCI protection for vending machines was expanded to other than cord- and plug-connected vending machines, such as direct hard wired vending machines. For cord- and plug-connected vending machines, the GFCI protection must be provided by a GFCI device that is "identified for portable use."

424.19 Fixed electric space heating equipment can be supplied by more than one source that can include more than one feeder or branch circuit.

2011 NEC Requirement. Simultaneous disconnecting means has to be provided to the heater, motor controller(s), and supplementary overcurrent protective device(s) of all fixed electric space-heating equipment. The disconnecting means generally has to have an ampere rating not less than 125 percent of the total load of the motors and the heaters. A provision for locking or adding a lock to the disconnecting means has to be installed on or at the disconnecting means and shall remain in place with or without the lock installed. Where heating equipment is supplied by more than one source, the disconnecting means is required to be grouped and marked. The sources supplying the heating equipment were not defined in the 2011 NEC.

2014 NEC Change. Language was added at 424.19 to clarify that the source of power supplying fixed electric space-heating equipment could be in the form of either feeders or branch circuits. A reference to the new 110.25 was added to take the place of the existing provisions addressing a lockable disconnecting means.

424.66(A) and (B) New provisions were put in place to require limited forms of working space about duct heaters for fixed electric space-heating equipment.

2011 NEC Requirement. As far as access or working space for duct heaters is concerned, 424.66 required duct heaters to be located with respect to building construction and other equipment so as to permit "access to the heater." This section goes on to indicate that sufficient clearance must be maintained to permit replacement of controls and heating elements, and for adjusting and cleaning of controls and other parts requiring such attention. One of the shortest sentences in the entire section simply states, "See 110.26." This does not necessarily indicate that the working space requirements of 110.26 must be met for duct heaters and other equipment installed in areas, such as above a suspended drop ceiling.

2014 NEC Change. The same provisions stated above of the 2011 NEC still exist at new 424.66(A), with new language added to send users of the Code to new 424.66(B) for working space provisions for electrical enclosures for duct heaters, which are mounted on duct systems and contain equipment that requires examination, adjustment, servicing, or maintenance while energized. The new language at 424.66(B) requires these enclosures, if located in a space above a ceiling, to be accessible through a lay in type ceiling or access panel(s). The width of the required working space must be equal to the width of the enclosure or a minimum of 762 mm (30 in.), whichever is greater. Any and all doors or hinged panels are required to have the ability to open at least 90 degrees. And, finally, the space in front of the enclosure must comply with Table 110.26(A)(1) working space depth requirements, with horizontal T-bar ceiling grid permitted in this space.

430.22(G) The current referred to within 430.22(G) is the current of the motor and not of the conductors. The term ampacity was removed as motors do not have ampacities; they have current values.

2011 NEC Requirement. Conductors for small motors are generally not permitted to be smaller than 14 AWG. Where installed in a cabinet or enclosure, specific 18 AWG copper conductors were permitted to be used for small motors (full-load ampacity greater than 3.5 up to 5 amperes). These small motors had to have circuits protected in accordance with 4.30.52, be provided with maximum Class 10 overload protection in accordance with 430.32, and have overcurrent protection provided in accordance with 240.4(D)(1)(2). These same provisions applied to small motors with full-load ampacities of 3.5 amperes or less when provided with maximum Class 20 overload protection. Similar provision for the use of 16 AWG copper conductors were given at 430.22(G)(2).

2014 NEC Change. Section 430.22(G) was revised to clarify that the current referred to within 430.22(G) is the current of the motor and not of the conductors. Further clarification was added to indicate that the 125 percent multiplier for continuous duty required by the parent text at 430.22 is not required to be calculated in determining the conductor sizing for these small motors, due to the fact the motor full-load current rating cannot exceed the values given in these subsections for 16 and 18 AWG conductors. The 125 percent multiplier is already included due to the limitations imposed on the maximum current rating of the motor allowed for the 16 and 18 AWG conductors. The term ampacity was removed throughout this subsection as it is only permitted to be used in conjunction with the ability of a conductor to carry current. Motors, devices, circuits, and utilization equipment do not have ampacities; they have current values.

430.52(C)(5) Semiconductor fuses intended to protect bypass contactors, isolation contactors, and conductors in a solid-state motor control system are permitted in lieu of devices listed in Table 430.52.

2011 NEC Requirement. "Suitable" fuses were permitted in lieu of devices listed in Table 430.52 for power electronic devices in a solid-state motor controller system. The suitable replacement fuse had to be marked "suitable" adjacent to the fuse.

2014 NEC Change. "Suitable fuses" were replaced with "semiconductor fuses" and their purpose was clarified as "intended for the protection of electronic devices." Examples of "power electronic devices," such as bypass and isolation contactors, were added along with their conductors.

74. 422.49 The requirement for cord- and plug-connected high-pressure spray washing machines to be provided with factory-installed GFCI protection for personnel includes:

- a. three-phase equipment rated 208Y/120 volts and 60 amperes or less
- b. to single-phase equipment rated 250 volts or less
- c. both a & b
- d. none of the above

75. 422.51 The requirement for _____ protection for vending machines was expanded to other than cord- and plug-connected vending machines, such as direct hard wired vending machines.

- a. AFCI
- b. GFCI
- c. combination AFCI/ GFCI
- d. both a & b

76. 422.51 Cord- and plug-connected vending machines, the GFCI protection must be provided by a GFCI device that is "_____ for portable use."

- a. approved
- b. marked
- c. identified
- d. listed

77. 424.19 Fixed electric space heating equipment can be supplied by more than one source that can include more than one _____.

- a. feeder
- b. branch circuit
- c. both a & b
- d. none of the above

78. 424.66(A) and (B) _____ provisions were put in place to require limited forms of working space about duct heaters for fixed electric space-heating equipment.
- a. revised
 - b. relocated
 - c. new
 - d. deleted
79. 430.22(G) The current referred to within 430.22(G) is the _____ of the motor and not of the conductors. The term ampacity was removed as motors do not have ampacities; they have current values.
- a. conductors
 - b. current
 - c. both a & b
 - d. none of the above
80. 430.52(C)(5) Semiconductor fuses intended to protect _____ in a solid-state motor control system are permitted in lieu of devices listed in Table 430.52.
- a. bypass contactors
 - b. isolation contactors
 - c. conductors
 - d. all of the above

2014 NEC Analysis Part 3-Quiz Answer Sheet

<u>1</u>	a b c d	<u>27</u>	a b c d	<u>54</u>	a b c d
<u>2</u>	a b c d	<u>28</u>	a b c d	<u>55</u>	a b c d
<u>3</u>	a b c d	<u>29</u>	a b c d	<u>56</u>	a b c d
<u>4</u>	a b c d	<u>30</u>	a b c d	<u>57</u>	a b c d
<u>5</u>	a b c d	<u>31</u>	a b c d	<u>58</u>	a b c d
<u>6</u>	a b c d	<u>32</u>	a b c d	<u>59</u>	a b c d
<u>7</u>	a b c d	<u>33</u>	a b c d	<u>60</u>	a b c d
<u>8</u>	a b c d	<u>34</u>	a b c d	<u>61</u>	a b c d
<u>9</u>	a b c d	<u>35</u>	a b c d	<u>62</u>	a b c d
<u>10</u>	a b c d	<u>36</u>	a b c d	<u>63</u>	a b c d
<u>11</u>	a b c d	<u>37</u>	a b c d	<u>64</u>	a b c d
<u>12</u>	a b c d	<u>38</u>	a b c d	<u>65</u>	a b c d
<u>13</u>	a b c d	<u>39</u>	a b c d	<u>66</u>	a b c d
<u>14</u>	a b c d	<u>40</u>	a b c d	<u>67</u>	a b c d
<u>15</u>	a b c d	<u>41</u>	a b c d	<u>68</u>	a b c d
<u>16</u>	a b c d	<u>42</u>	a b c d	<u>69</u>	a b c d
<u>17</u>	a b c d	<u>43</u>	a b c d	<u>70</u>	a b c d
<u>18</u>	a b c d	<u>44</u>	a b c d	<u>71</u>	a b c d
<u>19</u>	a b c d	<u>45</u>	a b c d	<u>72</u>	a b c d
<u>20</u>	a b c d	<u>46</u>	a b c d	<u>73</u>	a b c d
<u>21</u>	a b c d	<u>47</u>	a b c d	<u>74</u>	a b c d
<u>22</u>	a b c d	<u>48</u>	a b c d	<u>75</u>	a b c d
<u>23</u>	a b c d	<u>49</u>	a b c d	<u>76</u>	a b c d
<u>24</u>	a b c d	<u>50</u>	a b c d	<u>77</u>	a b c d
<u>25</u>	a b c d	<u>51</u>	a b c d	<u>78</u>	a b c d
<u>26</u>	a b c d	<u>52</u>	a b c d	<u>79</u>	a b c d
		<u>53</u>	a b c d	<u>80</u>	a b c d

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