TC716 draft comments:

716.1 Scope

This part of IEC 60364 specifies requirements in electrical installations for the distribution of ELV DC range power using balanced, information technology cables and accessories primarily designed for data transmission, as specified in terms of a Category within the reference implementations of ISO/IEC 11801-1 using power feeding equipment in accordance with IEC62368-3.

Requirements are included for the design, erection, and verification of telecommunications infrastructure for the purpose of both telecommunications and distribution of ELV DC power feeding. In addition requirements are included for use of existing telecommunications infrastructure for distribution of ELV DC power.

The power delivery systems include, but are not restricted to, the Power over Ethernet systems specified by IEEE 802.3.

Comment: The reference to 11801-1 should be dated 2017 (corr 1, 2018?). IEEE 802.3 notes that PoE systems specified in IEEE 802.3 include the PoDL systems defined in Clause 104 that operate on a single pair. 11801-1 at present only covers the 2-pair and 4-pair systems compatible with 802.3 Clause 33 and Clause 145. Additionally, 11801-1 may never cover single pair.

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716.433.1.101 Protection against thermal effects including overcurrent

The protection against thermal effects and overcurrent shall be achieved by at least one of the three following principle measures:

- use of a protective device to disconnect any overcurrent in the circuit conductors
- designing the circuit so as to prevent an overcurrent to arise
- limitation of overcurrent by the characteristics of supply

Overload protection shall be provided by limitation of the power supply for all parallel sources of the power supply devices. The disconnection in case of overload shall be within 1 s. The circuit shall not reset automatically.

Comment: This one is still being debated. The problem is it can be interpreted. Typical PoE systems have a fused overcurrent/overload protection circuit that will not reset automatically (or ever) but also contain the PSE monitored Icut, Ilim circuits that do reset automatically. Would this design conform to the requirements of 716.433.1.101?

What is the definition of overcurrent? Overload? Need to get this to help answer our questions. Does a definition exist in 62368-1? **Chad to invite Mike Gilmour to a future meeting**. [send email, asking questions].

# Annex Q
(normative)
## Circuits intended for interconnection with building wiring

### Q.1 Limited power source

#### Q.1.1 Requirements

A limited power source shall comply with one of the following:

a) the output is inherently limited in compliance with Table Q.1; or
b) linear or non-linear impedance limits the output in compliance with Table Q.1. If a PTC device is used, it shall:
    1) pass the tests specified in Clauses 15, 17, J.15 and J.17 of IEC 60730-1:2010; or
    2) meet the requirements of IEC 60730-1 for a device providing Type 2.AL action;
    3) a regulating network limits the output in compliance with Table Q.1, both with and without a simulated single fault (see Clause B.4), in the regulating network (open circuit or short-circuit); or
c) an overcurrent protective device is used and the output is limited in compliance with Table Q.2; or
d) an IC current limiter complying with Clause G.9 that limits the output current in accordance with Table Q.1.

Where an overcurrent protective device is used, it shall be a fuse or a non-adjustable, non- autoreset, electromechanical device.

**Table Q.1 – Limits for inherently limited power sources**

| **Output voltage** [a] $U_{oc}$ | | **Output current** [b d] $I_{sc}$ | **Apparent power** [c d] $S$ |
|---|---|---|---|
| V a.c. | V d.c. | A | VA |
| $U_{oc} \leq 30$ | $U_{oc} \leq 30$ | ≤8,0 | ≤100 |
| – | $30 < U_{oc} \leq 60$ | ≤150/$U_{oc}$ | ≤100 |

[a] $U_{oc}$: Output voltage measured in accordance with B.2.3 with all load circuits disconnected. Voltages are for substantially sinusoidal a.c. and ripple free d.c. For non-sinusoidal a.c. and d.c. with ripple greater than 10 % of the peak, the peak voltage shall not exceed 42,4 V.

[b] $I_{sc}$: Maximum output current with any non-capacitive load, including a short-circuit.

[c] $S$ (VA): Maximum output VA with any non-capacitive load.

[d] Measurement of $I_{sc}$ and $S$ are made 5 s after application of the load if protection is by an electronic circuit and 60 s in case of a PTC device or in other cases.

**3.3.7.5**
**overload condition**
**abnormal operating condition** or **single fault condition** where the load stresses the equipment or circuit beyond **normal operating conditions**, but does not, immediately, result in a non-operating state

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716.521 Types of wiring system
716.521.101

Information technology cables used for the distribution of DC power shall comply with Category 5, Category 6, Category 6A, Category 7, Category 7A, Category 8.1 or Category 8.2

Comment: The title of this section is Types of Wiring System but the text addresses components and not all the components, just cable. Need to add a section under 521 on connectors.
7/25/18: alternately, change 'cables' to 'cables and components'. [simple wording change would be the preferred solution].

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716.523 Current carrying capacities
716.523.1.101

The maximum operating temperature for cables complying with ISO/IEC 11801-1 requirements for Category 5, Category 6, Category 6A, Category 7, Category 7A, Category 8.1 or Category 8.2 shall not exceed 60°C.

Comment: The maximum operating temperature is defined in 11801-1, no need to redefine here. Additionally, the requirement here ignores the MICE 2&3 environments. Change the word cables to components. Rewrite the sentence to refer to 11801 for temperature.
Does this doc become law?
7/25/18: change 'cables' to 'cables and components'. **Rewrite the sentence to refer to 11801 for temperature.**
The maximum operating temperature for Category 5, Category 6, Category 6A, Category 7, Category 7A, Category 8.1 or Category 8.2 cables and components shall not exceed ISO/IEC 11801-1 requirements.

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NEC Public Comments

250.119 Identification of Equipment Grounding Conductors.
Unless required elsewhere in this Code, equipment grounding conductors shall be permitted to be bare, covered, or insulated. **Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green or green with one or more yellow stripes except as permitted in this section.** Conductors with insulation or indi- vidual covering that is green, green with one or more yellow stripes, or otherwise identified as permitted by this section shall not be used for ungrounded or grounded circuit conductors.

Exception No. 1: Power-limited Class 2 or Class 3 cables, power-limited fire alarm cables, or **communications cables containing only circuits operating at less than 50 volts where connected to equipment not required to be grounded in accordance with 250.112(I) shall be permit- ted to use a conductor with green insulation or green with one or more yellow stripes for other than equipment grounding purposes.**
[for reference: 250.112 Specific Equipment Fastened in Place (Fixed) or Connected by Permanent Wiring Methods. Except as permit- ted in 250.112(F) and (I), exposed, normally non–current- carrying metal parts of equipment described in 250.112(A) through (K), and normally non–current-carrying metal parts of equipment and enclosures described in 250.112(L) and (M), shall be connected to an equipment grounding conductor, regardless of voltage.
(I) Remote-Control, Signaling, and Fire Alarm Circuits.
Equipment supplied by Class 1 circuits shall be grounded unless operating at less than 50 volts. Equipment supplied by Class 1 power-limited circuits, by Class 2 and Class 3 remote- control and signaling circuits, and by fire alarm circuits shall be grounded where system grounding is required by Part II (**System Grounding**) or Part VIII (**Direct-Current Systems**) of this article.]

Adhoc recommended Public Comment to the rejection of PI 1743: The addition of PoE to 725.144 in the 2017 NEC has the unintended consequence that green conductors in a Category cable must be equipment ground. Exemption No. 1 allows green conductors to not be equipment ground but only for circuits of less than 50V. Some IEEE compliant standardized PoE systems have a minimum port voltage of 50V, and all of them allow port voltage up to 57V. Therefore, IEEE compliant PoE does not qualify for the exemption and this makes hundreds of millions of PoE installations violate the Code. This exemption was added from the inception of this text specifically for Category cabling. If these hundreds of millions of Ethernet ports were forced to follow Code, they would not be functioning today. An exemption in practice exists where it may not exist in text – hundreds of millions of these ports have been installed for almost 20 years operating at or above 50V. Request to fix the exemption by changing 50V to 60V.
Alternate suggestion: ask for an 802.3 PoE specific exemption that gives 60V. perhaps file two PCs.
7/25/18: 'compliant to Clause 33 or Clause 145 of IEEE 802.3-2018'. OR: exemption for systems using Category cabling as described in 568D.2 that have 2kV DC or 1.5kV AC isolation from earth ground to connections to Class 2 power source.

PC #1:
This comment is filed on behalf of the IEEE 802.3 Working Group. For reference, this comment is labeled IEEE802.3#1.
The addition of PoE to 725.144 in the 2017 NEC has the unintended consequence that green conductors in a Category cable must be equipment ground. 250.119 Exemption No. 1 allows green conductors to not be equipment ground, but only for circuits of less than 50V. Some IEEE compliant standardized PoE systems have a minimum port voltage of 50V and all of them allow port voltage up to 57V. Therefore, IEEE compliant PoE does not qualify for the exemption, making hundreds of millions of PoE installations violate the Code. This exemption was added from the inception of this text, specifically for Category cabling. If these Ethernet ports were forced to follow Code, they would not be functioning today as the requirement to have the green conductors be equipment ground would halt communication. An exemption in practice exists where it does not exist in text – hundreds of millions of these ports have been installed for almost 20 years operating at or above 50V with zero record of loss. IEEE 802.3 requests to fix the exemption by changing 50V to 60V.

PC#2:
This comment is filed on behalf of the IEEE 802.3 Working Group. This is a companion comment to a previous comment labeled IEEE802.3#1. If IEEE802.3#1 is accepted, this comment is withdrawn.
250.119 Exception No. 1 intends to allow Category cable to have green sheathed conductors that are not equipment ground but limits the exemption to 50V, therefore excluding PoE systems which operate up to 60V (based on the SELV section of IEC/UL 60950). An alternate solution to raising the voltage in Exception No. 1 to 60V is to add a new exception.
*Exception No. 1a: Systems using Category cabling as described in ANSI/TIA-568.2-D-2018 that have **2.25kV DC or 1.5kV AC isolation from earth ground to the twisted pair signal conductors** shall be permitted to use a conductor with green insulation or green with one or more stripes for other than equipment grounding purposes.*
AI to Chad: check with Jon Lewis that this text will still be valid after the isolation adhoc closes.

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725.144

Nominal Current

Comment: Recommend that IEEE 802.3 reiterate that the term 'Rated' alone is the wrong term to use to describe the current in a PoE system. IEEE 802.3 has no opinion on what the term should be except that it's not simply 'rated current' – TBD based on outcome of NEC PoE TG #2
George to give update on TG next meeting.
8/1/18 – IEEE 802.3 to take the TG output and write our own PC using the TG text. Very short PC. *Chad to draft (with George).*