

IEC 60950 (-1) in IEEE 802.3- 2015 and published amendments

802.3 Isolation Ad Hoc – Berlin, Germany Plenary Meeting

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IEC 60950 and 60950-1 locations

- 119 occurrences in the IEEE Std 802.3-2015
- Clauses:
 - 8,9,10,12,14,15,23,25,27,32,33,38,40,41,52,53,55,58,59,60,68,70,71,72,75,84,86,87,88,89,93,94,95,Annex 83A,Annex 83B, Annex 86A
- Also occurs in the following amendments currently published.
- IEEE Std 802.3bw-2015, IEEE Std 802.3by-2016, IEEE Std 802.3bq-2016, IEEE Std 802.3bp-2016, IEEE Std 802.3bn-2016, IEEE Std 802.3bz-2016

Where Used? (IEEE Std. 802.3-2015)

- Normative References
 - 2 references (60950:1991, 60950-1)
- Isolation Requirements
 - 14 references (Each references the spec more than 1x)
 - **8.3.2, 9.9.3.1, 12.10.1**, 14.3.1.1, 15.3.4, **23.5.1.1, 23.12.4.12 (PICS)**, 25.4.6, **32.6.1.1, 32.13.5.8 (PICS), 33.4.1**, 40.6.1.1, 40.12.7 (PICS), 55.5.1
- General Safety
 - 63 references
 - **8.7.1, 8.8.6.11 (PICS)**, 14.7.123.12.4.16, 14.10.4.5.15 (PICS), **23.9.1, 23.12.4.12 (PICS), 23.12.4.16 (PICS), 27.5.1, 27.7.4.11 (PICS), 32.10.1, 32.13.5.11 (PICS), 33.4.1, 33.7.1, 33.8.3.9 (PICS)**, 38.7.1, 38.12.4.5 (PICS), 40.9.1, 40.12.10 (PICS), 41.4.1, 41.6.4.11 (PICS), 52.10.1, 52.15.3.11 (PICS), 53.10.1, 53.15.4.5 (PICS), 55.9.1, 55.12.9 (PICS), 58.8.1, 58.10.3.6 (PICS), 59.8.1, 59.10.3.6 (PICS), 60.10.1, 60.12.4.12 (PICS), 68.10.3.5 (PICS), 70.9.1, 70.10.4.5 (PICS), 71.9.1, 71.10.4.6 (PICS), 72.9.1, 72.10.4.7 (PICS), 75.8.1, 75.10.4.19 (PICS), 84.10.1, 84.11.4.5 (PICS), 86.9.1, 86.11.4.5 (PICS), 87.9.1, 87.13.4.6 (PICS), 88.9.1, 88.12.4.6 (PICS), 89.8.1, 89.11.4.5 (PICS), 93.10.1, 93.11.4.5 (PICS), 94.5.1, 94.6.4.6 (PICS), 95.9.1, 95.12.4.5 (PICS), 83A.6.1, 83A.7.7 (PICS), 83B.3.1, 83B.4.6 (PICS), 86A.7.1, 86A.8.4.4 (PICS)
- Regulatory requirements
 - **10.8.3**

Clauses in RED are no longer being maintained

8.3.2.1 Electrical isolation

The MAU must provide isolation between the AUI cable and the coaxial trunk cable. This isolation shall withstand at least one of the following electrical strength tests:

- 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in 5.3.2 of IEC 60950: 1991.
- 2250 Vdc for 60 s, applied as specified in 5.3.2 of IEC 60950: 1991.
- A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 μ s (1.2 μ s virtual front time, 50 μ s virtual time of half value), as defined in IEC 60060.

There shall be no isolation breakdown, as defined in 5.3.2 of IEC 60950: 1991, during the test. The resistance after the test shall be at least 2 M Ω , measured at 500 Vdc. In addition, the isolation impedance between the DTE and the coaxial cable shield shall be less than 15 Ω between 3 MHz and 30 MHz.

14.7.1 General safety

All equipment meeting this standard shall conform to IEC 60950-1.

10.8.3 Regulatory requirements

The MAU and medium should consider IEC 60950 in addition to local and national regulations. See IEC 60950 and [B53].

Where used - amendments

- IEEE Std. 802.3bw-2015: 96.9.1(GS), 96.11.4.9 (PICS)
- IEEE Std. 802.3by-2016: 112.8.1(GS), 112.11.4.5 (PICS)
- IEEE Std. 802.3bq-2016: 113.5.1(I), 113.9.1(GS), 113.12.10 (PICS)
- IEEE Std. 802.3bp-2016: 97.9.1(GS), 97.11.13 (PICS)
- IEEE Std. 802.3bn-2016: 100.5.1(GS), 100.7.3.3 (PICS)
- IEEE Std. 802.3bz-2016: 126.5.1(I), 126.9.1(GS), 126.12.9 (PICS)

Inconsistent use of dated references

- Dates to be used when specific sections are referenced.
 - 23.12.4.12: None per IEC 60950: 1991 (dated when not necessary?)
 - 32.6.1.1: Section 5.3.2 of IEC 60950 (Not Dated but should be)

Inconsistent test definition

- For the Isolation test specified there are 3 options which include a pulse test and has two references depending on clause:
 - A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 μ s (1.2 μ s virtual front time, 50 μ s virtual time of half value), as defined in **IEC 60950-1:2001 Annex N**.
 - This is also referenced in other clauses as:
 - A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 μ s (1.2 μ s virtual front time, 50 μ s virtual time or half value), as defined in **IEC 60060**.
- 33.4.1 electrical strength tests: c) uses 1500 V where all other references are 2400 V. Note that the pulse is also different and this is likely intended (Need assistance from the PoE folks)

Change the scope of the ad hoc as follows:

- IEEE 802.3 Isolation Ad Hoc
- There are subclauses titled 'Electrical isolation' throughout IEEE Std 802.3 requiring isolation meet one of three electrical strength tests with references to IEC 60950-1 'Information technology equipment - Safety - Part 1: General requirements'. However, IEC 62368-1 'Audio/video, information and communication technology equipment - Part 1: Safety requirements' will soon replace IEC 60950-1, as well as IEC 60065 'Audio, video and similar electronic apparatus - Safety requirements'. IEC 62368-1 is not just a merge of these two standards, it is a new standard that has been developed using Hazard-Based Safety Engineering (HBSE), and is more performance oriented.
- **Based on the above, as I announced at the IEEE 802.3 interim meeting last week, I'm chartering an IEEE 802.3 Isolation Ad Hoc under the IEEE 802.3 Working Group:**
 - To examine the references to IEC 60950 and IEC 60950-1 and other isolation text in IEEE Std 802.3. Remedy would be through the maintenance request process and, if required, build consensus on proposed updates to request an amendment project.**

Proposed changes to IEEE 802.3 standard

- No changes to clauses currently not maintained:
 - **Isolation: 8.3.2, 9.9.3.1, 12.10.1, 23.5.1.1, 23.12.4.12 (PICS), 32.6.1.1, 32.13.5.8 (PICS), 33.4.1**
 - **General Safety: 8.7.1, 8.8.6.11 (PICS), 23.9.1, 23.12.4.12 (PICS), 23.12.4.16 (PICS), 27.5.1, 27.7.4.11 (PICS), 32.10.1, 32.13.5.11 (PICS), 33.4.1, 33.7.1, 33.8.3.9 (PICS)**
 - **Regulatory: 10.8.3**
- Add IEC 62368-1 to Section 1. (Maintenance Request)
 - IEC 62368-1, Audio/video, information and communication technology equipment – Part 1: Safety requirements.

Proposed changes to IEEE 802.3 standard

- General Safety – Maintenance request(s) to support the following change.
- Example Text:
 - “**14.7.1 General safety**
All equipment meeting this standard shall conform to IEC 60950-1.
- Suggested Text
 - “**14.7.1 General safety**
All equipment meeting this standard shall conform to IEC 60950-1 or IEC 62368-1.

Open Questions

- Maintenance request or Corrigendum?
- Do we remove the isolation and general safety statements to a common location and reference that location in all clauses?
- How to handle Automotive requirements which have different safety specifications?
- Is there a need to put a note about in Section 1 where IEC 60950 and IEC 60950-1 are called out noting that they are superseded?
- Why is there a difference in the pulse test definition in clause 33?
- How to specify the isolation test using IEC 62368-1?
 - See [peker_01_0517.pdf](#) for some suggestions from Arkadiy Peker, Microsemi