

As of: 6/22/18 12:33 PM
Received: June 20, 2018
Status: Pending_Post
Tracking No. 1k2-93tv-7t2p
Comments Due: June 25, 2018
Submission Type: Web

PUBLIC SUBMISSION

Docket: NRC-2018-0076

Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems

Comment On: NRC-2018-0076-0001

Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems

Document: NRC-2018-0076-DRAFT-0003

Comment on FR Doc # 2018-08493

Submitter Information

Name: David Herrell

Address:

MPR Associates

320 King St Ste 400

Alexandria, VA, 22314

Email: dherrell@mpr.com

General Comment

See attached file(s)

Attachments

RG 1.180 draft R2 MPR Comments on DG-1333

SUNSI Review Complete

Template = ADM-013

E-RIDS=ADM-03

ADD= Jazel Parks, Michael Eudy,

Thomas Boyce

COMMENT (3) PUBLICATION

DATE: 4/24/2018 CITATION: 83

FR 17867

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
	General	MIL-STD-461 and the IEC Standards receive revisions much more frequently than the Regulatory Guide. These revisions often provide valuable clarification and improved test direction.	The revised RG 1.180 should include a statement that allows use of the latest versions of MIL-STD-461 and the IEC Standards, subject to the condition that the test levels and frequency ranges specified in the RG take precedence over any revised test levels or frequency ranges cited in the latest MIL-STD-461 or IEC Standards.
8	C.1	This document should provide a path forward for industry since current existing installations use equipment qualified to RG 1.180 Rev. 1. Further, pre-qualified platforms have mostly been qualified against the requirements of RG 1.180 Rev. 1, and this document is silent about requirements for use of that equipment without repeating already-completed equipment qualification tests to new requirements.	Industry needs a statement that equipment previously qualified to RG 1.180 Rev 1 is still acceptable without having to generate an extensive comparison of RG 1.180 Rev 1 to Rev 2 levels and an evaluation of acceptance for each application.
8	C.1	This document indicates that new analog equipment is to be qualified to these levels. The older analog safety systems (that we are replacing with new analog safety system) would not pass many of these tests, and have operated successfully for many years. What is the technical basis for requiring such tests as EFT and SWC to these replacement modules, when EFT and SWC have not been demonstrated to be problems to the existing analog equipment?	Provide a method or process that would allow replacement analog modules to be subjected only to those tests that the equipment being replaced would have passed, especially for the potentially destructive ring wave and combination wave tests that the existing analog modules would have failed, but also other challenging tests that operating experience shows are not required to demonstrate proper function of components in these environments.
8	C.1	The last line of the paragraph starting "The electromagnetic conditions at the point of installation..." is not very clear.	Replace "that are greater than 8 decibel (dB) below the specified operating envelopes." with something more like "that provide at least 8 decibels (dB) of margin below the specified operating envelopes."

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
11 & 14	C.3 & C.3.5	Allowing use of both IEC and MIL-STD methods to test emissions, based on the phenomena, provides appropriate test flexibility, along with appropriate directions to ensure that overlap exists between frequency ranges tested.	None.
12	C.3.1	The test ranges in the text and the figure should match.	Replace the first sentence with two sentences "For DC power leads, this test is performed from 30 Hz to 10 kHz. For AC power leads, this test is performed from the second harmonic of the power line frequency from 120 Hz for 60 Hz power or 100 Hz for 50 Hz power to 10 kHz."
12	C.3.1	In Figure 3.1, the AC curves have significant relaxation, in requirements, especially for the previous curves with power >1 kVA. It appears that eliminating the <1 kVA curve may generate problems in qualifying equipment, as there is a 2-3 db decrease in allowable at 120 Hz between Revision 1 and this revision. There is no technical reason to reduce the limit for low power equipment for the lower harmonics.	The present allowable limit is slightly higher from 120Hz to about 240Hz and the tighter limit could especially affect qualification of equipment <1KVA. Please consider whether providing an equivalent small second harmonic allowance when power levels are <1 kVA is reasonable.
14	C.3.4	Incorporating requirements to test to 10 GHz is appropriate. However, many older NRC Safety Evaluations and equipment in use were only tested to 1 GHz.	Please provide a statement that equipment previously qualified to RG 1.180 Rev 1 is still acceptable without having to generate an extensive argument for the missing 1 GHz to 10 GHz testing for each application.
12	C.3.2	For the CE102 test, the allowable emissions levels are dependent on the equipment operating voltage. It is not clear which level should be used when the equipment operating voltage falls between two given levels.	Provide a CE102 specific requirement for which test levels are to be used when the equipment operating voltage falls between two given test levels.

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
14	C.3.5	Section 3.5 describes two options for addressing the lack of low frequency conducted or radiated emissions measurement in IEC 61000-6-4. Option 1 states that omitting low frequency emissions measurements is acceptable if "power quality controls are in place" as described in Section 3.1 for CE-101 testing. In Section 3.1 two conditions are given: 1) power quality requirements of the equipment are consistent with the existing power supply, and 2) the equipment does not impose additional harmonic distortion on the existing power distribution system that exceeds 5% THD. It is not clear how these two conditions would be demonstrated for new I&C equipment.	Condition 1) seems to require that the existing plant power supply can provide power quality within the specifications of the new equipment. Provide examples of what these power quality specifications would be (voltage, frequency, current, ripple, dip and rise?), and explain why this is a concern regarding emissions from the new equipment. Condition 2) would seem to require a test that measures the change in the THD on the existing plant power distribution system when the new equipment is operated. The THD of the new equipment could be measured separately but it is not understood how those results could be mathematically combined with the THD of the existing system. Also, under what conditions would the THD of the existing system be measured? If this is intended to be an actual, practical approach to justifying omission of low frequency emissions testing, more guidance is needed on how to implement it.
17	C.4	In Table 7, IEC 61000-4-16 applies from 0 Hz (DC) to 150 kHz.	In Table 7, revise the description for IEC 61000-4-16 to read "0 Hz to 150 kHz".
18	C.4.1.1	The first sentence in the CS101 test definition incorrectly specifies the frequency range, which conflicts with the last sentences in the same paragraph.	Replace the end of the first sentence "... in the frequency range 30 Hz to 150 kHz." with "... in the frequency ranges specified below." Since the ac powered devices start at a different frequency than dc powered devices.
19	C.4.1.2	Figure 4.2 does not specifically define the test levels at 0.01 MHz and 0.15 MHz.	Revise Figure 4.2 to specifically define the test levels at 0.01 MHz and 0.15 MHz, both as dotted horizontal lines and numeric dB μ A values.
20	C.4.1.3	Table 10 has a blank row between Harmonic Nos. 7 and 9.	In Table 10, remove the blank row between Harmonic Nos. 7 and 9.

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
21	C.4.2	In Table 15, the CS115 levels increased from 2A in Rev. 1 to 5 A in Rev. 2. Further, the text requires doubling this limit for installations with greater exposure. There is no apparent technical reason provided for either of these substantial increases in test levels.	Either provide a technical rationale for going from 2 to 5 amps and for doubling the test levels in high exposure installations, or restore the previous test levels.
21	C.4.2	Table 15, the specification for CS116 is incomplete. Implementing CS116 requires specifying the frequencies that are to be tested (defaults are 0.01, 0.1, 1, 10, 30 and 100 MHz). The test level varies by frequency according to Figure CS116-2 in MIL-STD-461, and does not reach the maximum level until the test frequency is at or above 1 MHz.	Revise Table 15 to specifically state the frequency and test level criteria for performing CS116.
22	C.4.2	In Tables 16 and 17, the legend uses Withstand as does the text. However, the IEEE standard discusses Low, Medium, and High Exposure which generates questions when trying to apply the RG. While we see the distinction made in the text introducing the tables, the tables should provide a straightforward path to the standards. Changing the terminology does not provide that straightforward path.	Replace "Withstand" with "Exposure" in the legends for Tables 16 and 17, as well as within the text associated with the figures.
22	C.4.2	In Table 16, the IEC 61000-4-5 test levels are doubled when compared with RG 1.180 Revision 1. The levels were 1,000 volts and 500 amps which is increased to 2,000 and 1,000 amps, with no referenced technical rationale or requirement for increasing the susceptibility test levels.	Provide a technical basis for doubling the test levels (changing Level 2 to Level 3), or return to the test levels provided in RG 1.180, Rev. 1.
23	C.4.3.2	In Figure 4.3, there is no label on the vertical dashed line, which appears to be around 60 Hz.	Please add a label defining the frequency on the vertical dashed line, between 0.01 Hz and 0.1 Hz.

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
26	C.5	In Tables 21 and 22, the Ring Wave surge waveform has short-circuit current specifications similar to those for the Combination wave specification. From IEC 61000-4-123, the short circuit current rise time is 0.6 μ s, the duration is 100 kHz, and the peak current varies with peak voltage.	Revise Tables 21 and 22 to include the relevant Ring Wave surge waveform short-circuit current specifications. At 2 kV, the peak current is 66.7 A. At 4 kV, the peak current is 133.3 A.
29	C.5.3	Section 5.3 for EFT testing does not specify the burst period (time between 15 msec bursts).	Section 5.3 should be revised to specify the EFT testing burst period (presumably 300 msec).
29	C.5.3	The EFT testing specification states that for peak test voltages less than or equal to 2 kV, the pulse frequency is 5 kHz, and for peak test voltages greater than 2 kV, the pulse frequency is 2.5 kHz. IEC 61000-4-4 has no requirement for a pulse frequency of 2.5 kHz, regardless of the peak test voltage. The two pulse frequencies given in IEC 61000-4-4 are 5 kHz and 100 kHz, where 5 kHz is traditional and 100 kHz is optional. Test generators built for implementing IEC 61000-4-4 typically do not have the option to use a pulse frequency of 2.5 kHz, requiring custom test equipment or justification for deviation when working to this guideline.	If implementing IEC 61000-4-4 EFT testing, consider revising the requirement to include only 5 kHz pulse frequencies.
30 & 31	C.6	With the restriction of ESD testing limited to overt effects (i.e., visible or detectable disturbance) and the implicit elimination of latent damage to the electronics from ESD, the testing is acceptable.	No change recommended. Much like testing for smoke exposure, ESD exposure can create latent defects in integrated circuits, which manifest months or years later. The testing provided is appropriate.
30 & 31	C.6	With the restriction of ESD testing to that which can be touched during normal operation, there is an implicit, unstated requirement for ESD protection for maintenance of equipment not normally accessible.	Please provide an explicit statement that the licensee is responsible for ensuring that appropriate, effective ESD protection is worn during any evolution where equipment is touched that has not been ESD tested for overt effects.

MPR Associates Comments on Draft Guide 1333, RG 1.180 Draft Rev. 2

PDF Page	Section No.	Concern	Recommended Change
31	C.6	Normally, the 8 kV and 15 kV requirements are stated as bipolar exposures, ± 8 kV and ± 15 kV. This ensures that both polarities of ESD tests are performed.	Unless the intent is to require only one of the tests, please add the \pm symbol to both the 8 kV and 15 kV requirements.