received 11/4/02

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DG-1119 Comments - EMIRFI Rulemaking Guidance from James W. Shank

9/6/02 67 Fie 57044 (1)



Remplile - ADM-013

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Draft Regulatory Guide DG-1119, "Guidelines for Evaluating Electromagnetic and Radio Frequency Interference in Safety-Related Instrumentation and Control Systems"

Comments and Feedback from the members of the EPRI EMI Working Group

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#	Subject	Section/	Comments
ļ		Page No.	
1	EPRI TR-	B/Page 5	The use of the word "both methods" implies that the NRC is endorsing
	102323		Regulatory Guide 1.180 and the revisions of DG-1119. Does the NRC
	Endorsement		plan to review and endorse the most current revision of TR-102323 via
<u> </u>			SER as well?
2	Qualification	C/Page 8 (3 ¹⁰	Add "and other design parameters that may impact the EMI/RFI
	Impacts	paragraph)	qualification testing results" to the end of the 3 rd paragraph.
3	Cameras and	C/Page 8	Cameras and flash attachments generate ultraviolet emissions at 10 ¹³
	other sources	(last	10 ¹⁰ Hz, which are outside the band of traditional EMI/RFI testing
	of flashes	paragraph)	programs and should not be included in the scope of this guidance. In
			addition licensee events attributable to ultraviolet emissions may be
			avoided by maintaining protective coverings over EEPROM's and other
			devices sensitive to ultraviolet emissions.
4	RFI	C/Page 8-9	Free-space loss for radiated emissions is frequency dependent as can be
	Exclusion		seen from a review of the formulas to estimate radio transmission loss
	Zones		and similar items. Portable transceivers that transmit in the 2 GHz
			range and above have a much shorter transmission distance than VHF
			and UHF (150 MHz and 450 MHz respectively) devices of the same
j			power level. Therefore, it is recommended that guidance be provided or
			at least an allowance included in the regulatory guide to address the
			lower field strengths expected at higher frequencies. This is necessary
			in order to use the higher frequency devices in control rooms and other
			sensitive areas, while excluding the lower frequency devices that may
			cause interference.
5	MIL-Std-	C.1.General/	Table 1 does not endorse or older versions of Mil-Std-461C & D. DG-
	461C/D	Table 1	1119 should be revised to state that equipment previously qualified to
			461C & D meet the testing requirements provided the complete scope of
			susceptibility and emissions testing has been addressed. It should also
			state that new equipment should be qualified to the endorsed 461E and
			IEC 61000 series standards.
6	Conducted	C.3.1/page	DG-1119 specifies a custom limit that differs from 461E and TR-
	Emissions/	13	102323 R2 (which agree and use the CE101-4 limit). The DG-1119
	CE101		limit appears to model the CE101-2 limit for submarines and the base
			limit curve offers some relaxation at lower frequencies, but overall is
			more restrictive over the 200 Hz – 10 kHz frequency range. The
			technical basis for this custom limit, which is undesirable, is not clear
			and this more restrictive testing level is not necessary to ensure adequate
			equipment emissions controls.
7	Conducted	C.3.2/page	DG-1119 requires this test. TR-102323 R2 provides an exemption for

	Emissions/ CE102	13-14	this testing requirement when the design includes power line filtering or other emissions controls on AC power lines to address high frequency conducted emissions. DG-1119 should provide consider provisions that would allow for waiving this testing requirement if design conditions are satisfied.
			DG-1119 specifies a custom limit that differs from 461E and TR- 102323 R2. The DG-1119 limit is more restrictive than both 461E and 102323 R2 over the entire 10 kHz – 2 MHz frequency range. The technical basis for this custom limit, which is undesirable, is not clear and this more restrictive limit is not necessary to ensure adequate equipment emissions controls.
			To add value and provide benefit to the endorsement of IEC 61000-6-4, custom limits like those of Table 4 should be avoided and replaced with the limit within the currently approved standard that most closely matches the NRC desired level. In addition the differences between TR-102323 endorsed standards and DG-1119 standards should be resolved.
8	Radiated Emissions/ RE101	C.3.3/page 14-15	DG-1119 specifies a custom limit that differs from 461E and TR- 102323 R2. The DG-1119 limit is more restrictive over the entire 30 Hz - 100 kHz frequency range. The technical basis for this custom limit, which is undesirable, and the additional conservatism is not necessary to ensure adequate equipment emissions controls.
9	Radiated Emissions/ RE102	C.3.4/page 15-16	DG-1119 specifies a custom limit that differs from 461E and TR- 102323 R2. The DG-1119 limit is more restrictive over the entire 2 MHz – 1 GHz frequency range. The technical basis for this custom limit, which is undesirable, is not clear and this more restrictive limit is not necessary to ensure adequate equipment emissions controls. In addition the recommended limit does not include controls for frequencies above 1 GHz, which are currently in use and will become more common at several facilities.
			To add value and provide benefit to the endorsement of IEC 61000-6-4, custom limits like those of Table 5 should be avoided and replaced with the limit within the currently approved standard that most closely matches the NRC desired level. In addition the differences between TR-102323 endorsed standards and DG-1119 standards should be resolved.
10	Low- frequency Conducted Susceptibility Testing (CS101 & IEC61000-4-	C.4.1.1/page 19-20 & 21- 24	Table 7, Section C.4.1.3 and Section C.4.2 specify susceptibility test IEC 61000-4-16. The purpose of this conducted-susceptibility, low- frequency test is to assess immunity to conducted common-mode disturbances from 15 Hz to 150 kHz. There is not an equivalent MIL- STD-461E test (CS109) specified in Table 6 and no basis has been provided for this expanded testing scope. This equivalent test is not required in R.G1.180 and TR-102323 R2. IEC 61000-4-16 should be

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	13 & 4-16)		removed from Table 7 unless adequate justification and basis for
			needing this test is documented.
11	High-	C.4.1.2,	DG-1119 specifies a custom limits for both power and signal cables that
	Frequency	C4.1.3 and	differ from 461E and TR-102323 R2. The DG-1119 limit for power
	Conducted	C.4.2/pages	cables is more conservative than TR-102323 R2 over the 10 kHz – 200
	Susceptibility	20-26	kHz frequency range. The DG-1119 limit for signal cables in Table 17
	Testing	:	appears to be in error and specifies a limit of 91 dBmA. It is believed
	(CS114 &		that the staff intended for this limit to be $91dB\mu A$. Either way, the DG-
	IEC61000-4-6		1119 limit for signal cables is more conservative than TR-102323 R2
	& 4-16)		over the entire $10 \text{ kHz} - 20 \text{ MHz}$ frequency range. The technical basis
			for these custom limits, which are undesirable, is not clear and these
			more conservative limits are not necessary to demonstrate acceptable
			equipment susceptibility.
			To add value and provide benefit to the endorsement of IEC 61000-4-6,
			custom limits like those of Table 17 & 18 should be avoided and
			replaced with the Class 2 or 3 limit within the currently approved
			standard that most closely matches the NRC desired level if possible. In
			addition the basis for the 134 dB μ A limit and relationship between this
			test and the corresponding RS103 test limit (10 V/m) are unclear.
12	High-	C.4.3.2/pages	DG-1119 endorses testing in accordance with the RS103 and 61000-4-3
	Frequency	28-30	standards to a 10 V/m limit, however the DG is not clear on what range
	Radiated		of testing frequencies apply for testing performed in accordance with
	Susceptibility		the 61000-4-3 standard. The 61000-4-3 test is typically performed
	Testing		from 80 MHZ to 1 GHZ. DG-1119 needs to specify frequency chiefla
	IEC61000-4-		101 01000-4-5 testing.
	3)		DG-1119 does not address susceptibility testing above 1 GHz. TR-
			102323 R2 specifies testing up to 10 GHz to ensure equipment is not
			affected by the emissions of new devices operating above 1 GHz, which
			are becoming more popular and common.
13	Surge	C.5.1 &	Table 26 and Section C.5.1 specify a ring-wave surge susceptibility test
	Susceptibility	C.5.2/pages	in accordance with IEC 61000-4-12. Tables 16 & 18 and Section C.4.2
	Testing	31-34	also specify a ring-wave surge susceptibility test in accordance with IEC
	(61000-4-12		61000-4-12 for signal lines. There is overlap between this test and the
	& 01000-4-5,		combination waveform of 01000-4-5. The slower rise time and duration $c_{1000} = 4.12$ moult in a loss shallowing test that the combination
	US110 OF		01 01000-4-12 result in a less challenging lest than the combination wave test $(61000, 4, 5)$ and it is believed that the combination wave test
	1001 P		wave test (01000-4-5) and it is believed that the combination wave test
	1991 & C62 45 1002		provides resonance frequencies that belief match a power plant
	(02.43-1992)		in accordance with IEC 61000-4-12 should be removed from DG-1110
		C.4.2/pages	Tables 15, 16, 17 & 18 and Section C.4.2 specify surge susceptibility
		24-26	testing in accordance with 61000-4-5 and 12 or CS116 for signal lines.
			The origin of proposed surges for signal lines within a protected
			structure in a controlled environment is not clear and until a basis for

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	Radiated	C 6/pages	needing this test is established, it should be deleted and removed from the DG-1119 scope of susceptibility testing. Note that TR-102323 R2 requires this test for shields and ground leads connected to remote (> 30 m) grounds, however does not require this test for signal (I/O, data & control) lines unless they are run externally to structures and outside of conduit. The ring wave surge susceptibility test of IEC 61000-6-12 is missing from Table 7 and should be added if this test is required scope.
14	Susceptibility	35-36	testing above 1 GHz. It also notes that RS103 addresses testing above 1
	Testing	55-50	GHz where 61000-4-3 does not. Section C.4.3.2 should be revised to
	Above 1 GHz		reflect the information of section C.6 to avoid confusion and the
			perception the RS103 test should end at 1 GHz as opposed to 10 GHz.
			Section C.6 could then be deleted.
			I divise Destine C.C. does not address high frequency redicted
			In addition Section C.6 does not address high frequency, radiated
			the need to control emissions above 1 GHz.
15	References	References/	The reference to EPRI TR-102323 is out of date and should refer to
,		page 38	Revision 2 published in November 2000.
16	General		It is recommended the staff consider adding a comment cautioning
\$			licensees on the potentially erroneous acceptance of products that are
			CE marked. Because there are differences in the scope and specified
			testing limits of CE marked equipment and equipment qualified in
			accordance with DG-1119, incensees should carefully review
			limits were applied
17	General		The current structure of DG-1119, and in particular the section on signal
			lines testing, can be confusing and difficult to follow. It is
			recommended that the staff work to clarify this scope of testing and
			make it easier for licensees to understand the guidance.

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