

Shielding Effectiveness Evaluation Using a Non-Standardized Method

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Abstract—This paper presents a shielding effectiveness evaluation for some metallic threads materials. The tests were performed using a non-standardized method in a dual transversal electromagnetic cell (DTEM). The materials' shielding characteristics must be properly evaluated in order to choose an appropriate shielding material. The tests were conducted for three different types of material designated for electromagnetic shielding. The tests were conducted with a non-standardized method which uses a simple and economical setup, with only two components: a DTEM cell and an EMI Test Receiver. In comparison with the standardized methods, the non-standardized method one used does not require large testing space and complicated setup and the material probe needed for DTEM measurements is considerably smaller than the one necessary for the standardized tests.

Keywords—attenuation, DTEM Cell, effectiveness shielding, shielding materials, electromagnetic shielding

REFERENCES

- [1] A. Nishikata, R. Saito, and Y. Yamanaka, "Equivalent circuit expression of dual TEM cell apparatus for shielding material evaluation," Proceedings of IEEE Symposium on Electromagnetic Compatibility, Sendai, 2004.
- [2] S. Kashyap, "Shielding Effectiveness Measurements with a Dual Tem Cell and a Split TEM Cell," 1986 IEEE International Symposium on Electromagnetic Compatibility, SAN DIEGO, CA, 1986, pp. 1-3.
- [3] IEEE 299/2006: "Method for measuring the effectiveness of electromagnetic shielding enclosures".
- [4] P. F. Wilson and M. T. Ma, "Shielding-Effectiveness Measurements with a Dual TEM Cell," in IEEE Transactions on Electromagnetic Compatibility, vol. EMC-27, no. 3, pp. 137-142, Aug. 1985.
- [5] V. Voicu, I. Pătru, P. M. Nicolae and L. A. Dina, "Analyzing the attenuation of electromagnetic shielding materials for frequencies under 1 GHz," 2017 10th International Symposium on Advanced Topics in Electrical Engineering (ATEE), Bucharest, 2017, pp. 336- 339.
- [6] P. M. Nicolae, I. D. Nicolae, D. G. Stanescu, I. D. Smarandescu and L. A. Dina, "The mobile phone immunity tests performed in a GTEM 250 cell," 3rd International Symposium on Environmental Friendly Energies and Applications (EFEA), St. Ouen, 2014, pp. 1-5.
- [7] J. P. Donohoe, Jun Xu and C. U. Pittman, "Variability of dual TEM cell shielding effectiveness measurements for vapor grown carbon nanofiber/vinyl ester composites," 2005 International Symposium on Electromagnetic Compatibility, 2005. EMC 2005., 2005, pp. 190-194 Vol. 1.
- [8] K. G. Thomas, K. M. Krishnaiah, A. Chordia and J. K. Daher, "Evaluation of electric field and magnetic field shielding effectiveness and polarizabilities of non metallic samples using dual TEM cell," Proceedings of IEEE Symposium on Electromagnetic Compatibility, Chicago, IL, 1994, pp. 291-293.
- [9] **R&S@ESCI EMI Test Receiver Operating Manual, web: <https://www.rohde-schwarz.com/us/manual/esci>.
- [10] Dual DTEM Cell Brochure, TESEQ.
- [11] A. Manara, "Measurement of material shielding effectiveness using a dual TEM cell and vector network analyzer," in IEEE Transactions on Electromagnetic Compatibility, vol. 38, no. 3, pp. 327-333, Aug 1996.
- [12] A. Marinescu, "The structure and properties of certain materials for architectural electromagnetic shielding," Workshop "Electromagnetic shielding in modern technique" Craiova, 30 June 2010.
- [13] G. Nicolae, "Measurement method for determining electromagnetic field attenuation in Nanomaterials using the TEM cell (2st Part)", RECENT, Vol. 10, no. 2(26), July, 2009.
- [14] C. Moraru, I. Bălan, "Methods for determining shielding effectiveness of materials," Electrotehnică, Electronică, Automatică, vol.63 (2015), nr.2.