Electromagnetic Absorbers and Normalization

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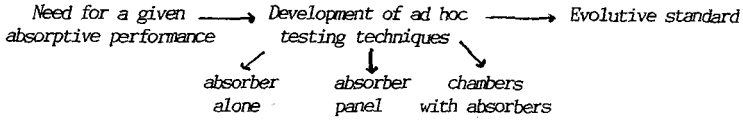
Abstract. *The IEEE Recommended Practice of RF-Absorber Evaluation in the Range 30 MHz to 5 GHz (PAR1128) is a good example of the "global" procedures, where worldwide EMC engineers can actively participate, and indeed make the PAR, and the future Standard a global event.*
We summarize hereunder the contents of the current document (about 70 pages) which has needed three years to establish, because of the permanent interactions :



1. INTRODUCTION

This IEEE Recommended Practice is a first attempt to give Manufacturers of RF Absorbers guide lines on how and what to measure in order to describe the performance of such materials.
This performance should be such that it can be utilized by the Users in the various equipments necessary to perform the measurements.
Next, procedures to characterize the bulk parameters of RF Absorbers are discussed.
This is followed by a discussion of the various methods used to measure the performance of RF Absorbers.
Next methods to evaluate the performance of applications of RF Absorbers are discussed.
Finally, recommended reporting procedures of the results of such measurements are outlined.
PAR1128 is not intended to be a definitive and detailed description on how to perform the various measurements discussed but only a sketch of how it can be done using presently available techniques.
Details of the procedures have to be developed by the manufacturers, for their particular line of products, and are a function of the availability of new technology and equipment.

2. FOREWORD

Interest in materials that absorb radio frequency energy has existed for many years. The recent increased regulation of sources of radio waves and equipment immunity has led to the need for more accurate determination of the electromagnetic field intensity.
As modern measuring antennas and receivers have increased measurements accuracy, the problem of making accurate measurements in less than optimum open-field environments has become a more important part of the overal measuring scene.
The practice of placing absorbing materials on the walls and ceiling of measuring sites to reduce reflections from these surfaces has become common.
However, claims for the efficacy of various absorbing materials have led to conflicting reports in the literature, confusing many potential purchasers of absorbing material.
An effort to end that confusion led to the development of PAR1128 in 1996. Following several years of work, the current document was developed.

Emphasis is put on the evolutionary aspects of the document, "guaranteed to change". New absorbers, with broader bandwidths and better reflectivity performances, are described, based upon progress in the science of new ferrites, with special designed permeability and permittivity spectra.

3. CONTENTS : HEADLINES

4. CONTENTS : COMMENTS

Chapter 1 to 5 describe the reason of the now forthcoming replacement of pyramidal resistive absorbers by ferrite absorbers, especially due to the low frequency reflectivity needs.

Chapter 6 to 8 describe the problems of evaluation of the reflectivity : from basic material testing (small samples) and simulation from μ *and* ϵ *spectra, to surface testing (several square meter surfaces), to finally overall performance in an anechoic chamber.*

Several specific items will be described in detail :

Definition of Site Attenuation, with new criteria, concerning non-vertical wave incidence. Importance of composite ferrite-resistive pyramidal absorbers ; forthcoming multilayer ferrite-absorbers. Current ferrites with controlled magnetic dispersion and low dielectric dispersion. New ferrites with controlled magnetic dispersion and dielectric dispersion. Research on co-fired composite ferrite absorbers. Perspectives for the possibility to cover the 30 MHz - 18 GHz frequency range.