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# RESULTS OF TYPE TESTING OF MTS-N DOSIMETERS WITH IEC 62387:2012 STANDARD AT THE LABORATORY OF EXTERNAL DOSIMETRY IN NICARAGUA

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**Introduction:** The purpose of this study is to present the results of the verification of the method of the dosimetry system for Hp(10) magnitude of the Laboratory of External Dosimetry LDE located at the Laboratory of Radiation Physics and Metrology (LAF-RAM).The tests verified according to the IEC 62387:2012 standard are: Coefficient of variation, Non linearity, Dosimeter drop,light exposure (reader), Dosimeter side, Radiation incidence over-response,Radiation energy and angle of incidence, Build up, fading, self-irradiance and natural radiation response (dosimeter).

**Material and method:** The tests were performed using a dosimetric system consisting of Rados RE-2000 TLD-reader, a Rados IR-2000 local irradiator of $^{90}Y$, approximately 60 TL-dosimeters. Irradiations were performed at the Laboratory of Calibration (LCD) of LAF-RAM, which has a $^{137}Cs$ source and standard chambers traceable to the IAEA Seibersdorf Laboratory in Austria. In the case of the Radiation energy and angle of incidence test, the TL-dosimeters were irradiated at the Laboratory of Metrology of Ionizing Radiations of LMRI of DEN-UFPE in Brazil. All crystals were read at 300° C with 2 seconds of preheating, 11 seconds of reading and 2 seconds of post-heating, the same proceedure was applied for annealing.

The following clauses of IEC 62387:2012 were verified: 11.2 Coefficient of variation CV: groups of 10 dosimeters irradiated at 6 different dose values 0.1 mSv, 0.3 mSv, 1 mSv, 3 mSv, 10 mSv and 30 mSv were used, with 3 mSv as the reference value. Considering Brunzendorf and Behrens1, the dose values w=6 (for w-2) and values of c1 1.046 (without outliers) for 10 dosimeters was used for the analysis of this requirement. 11.3 Non-linearity: for this the same dose information as indicated in CV was used.11.5 Radiation energy and angle of incidence: for 0° and 60° dosemeters were irradiated at N-80,N-60,N-40 and N-30. The reference dosimeter were irradiated at 0° to $^{137}Cs$. Opposite direction of dosimeter was checked as well using 16 dosimeters. 11.8 Overresponse to radiation incidence from the side: groups of 6 dosimeters were used and were irradiated free in air H*(10) at a dose of 3 mSv. The irradiation angles were 0° as the reference angle and the rest of the dosimeters from 70° to 110°. 13.4 Dose build-up, fading, self-irradiation, and response to natural radiation (dosimeter): a total of 84 dosimeters distributed in 8 groups were used. 13.8 Light exposure (reader): it was tried with two different light sources. 15.2 Drop (dosimeter) The thermoluminescent crystals were irradiated in the local IR-200 source and prepared in their respective holders or dosimeter holders. The requirement was verified with two options, dropping the dosimeters first on a rough surface and then on smooth surface; with respect to reference dosimeters that were not dropped.

**Results**: Compliance with the requirements of clauses 11.2 (results are shown in figure 1) , 11.3, 11.5, 11.8, 11.8, 13.8 and 15.2 was verified. It was observed that results do not comply with all inequalities in clause 13.4. It was found that there was a detachment of the metallic filter in 3 of the dosimeters evaluated, however, the pellets did not show observable damage.

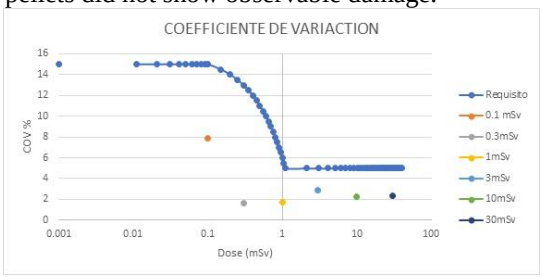


Figure 1: Results of CV.

**Conclusions:** The LDE dosimetric system for Hp(10) was verified as compliant with IEC 62387:2012 except for some temporary conditions of clause 13.4, so it is suggested to repeat the test by increasing the number of dosimeters.

**References:**

1. J.Bruzenorf and R. Berens, *How to type test the coefficient of variation of an indication*, Radiation Protection Dosimetry, 2007,123,21-31.