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Metrological support of VNIIFTRI for air ions measurements

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One of the parameters controlled in Russia that characterizes the cleanliness of the working space is the content of ions in a defined volume of air [1,2]. Air ions are the smallest complexes of atoms or molecules in the air that have a positive or negative charge. Under natural conditions, there are always positively and negatively charged light air ions in the open space air (air of forests, fields, seas and mountains). Scientists have detected a number of remarkable facts. The use of light air ions with negative polarity permits to reduce fatigability and tiredness, and accelerates rehabilitation from fatigue. However, constant presence of many people in a room, placement of equipment in small areas, increased electrostatic or electromagnetic field around the equipment, use of finishing materials that are not suitable for rooms with electronic equipment, leads to the degradation of air ion content in the air. Therefore, in production facilities and in offices it is necessary to control and maintain the ionic composition of the air. In addition, the content of ions in the air is the main quality indicator in aero onotherapy, where, in order to achieve a therapeutic effect, certain normalized concentration of negative ions in the air is necessary [2].

In order to provide metrological support in the field of measurement of air ions, the State Primary Standard for Volumetric Units of Volume Density of the Electric Charge of Ionized Air and the Number Concentration of air ions - GET 177-2010 has been developed [3-9] and has been successfully operated since 2010.

Metrological characteristics of the standard are:

- the range of units of polar volumetric density of the electric charge (number concentration) of air ions is from 1.6 · 10-2 to 200 nC · m-3 (from 108 to 1.2 · 1012 m-3);

- expanded uncertainty Up = 7,5 % with a coverage factor k = 2 and confidence level of p = 0.99.

In this field of measurement, VNIIFTRI provides metrological services for calibration and verification of measuring instruments, metrological expertise, tests for type approval, and develops working standards [10-12]. Over the past three years, on the basis of VNIIFTRI, two working standards (“REKLA-1” and “REKLA-1M”) for units of polar volumetric density of electric charge and number concentration of air ions were developed to equip Federal regional metrological centers of metrological services (Nizhny Novgorod FMC and Novosibirsk FMC).

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