Development of CALS-technology for computer quality management of anti-icing materials

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To automate the procedure of analytical monitoring of chemical anti-icing materials (AIM), we developed a system of computer-aided quality management (CQM-system). It was developed according to the information ISO-10303 STEP standard on the basis of the most perspective system of computer support: CALS technologies (Continuous Acquisition and Life-cycle Support).

The structure of the CALS-system of computer-aided quality management includes the dictionaries of analyzed AIM, the main quality indicators and their testing methods. The dictionaries associated with the technical documentation contain the following formal groupings: normative documentation (GOSTs, specifications, instructions, guidelines) and output documentation (basic standard reporting forms of analytical studies).

The structure of the developed CQM-system is based on the chemical composition of AIM. It includes the following 4 main categories: calcium, sodium and magnesium chlorides; acetates of ammonium, potassium and calcium; carbamides (urea, carbamide-ammonium nitrate); calcium and magnesium nitrates.

Each registered in the CQM system chemical AIM is evaluated for the most important quality indicators. They are combined into four subcategories: organoleptic (appearance, color, odor); physical-chemical (mass fraction of soluble salts, grain composition, chilling point (crystallization temperature), humidity, mass fraction of water insoluble substances, hydrogen index, density, dynamic viscosity); technological (melting capacity, hygroscopicity, caking); environmental (corrosion activity on metal, the index of aggressive impact on cement concrete, the specific effective activity of natural radionuclides, the permissible content of chemicals that are not related to the active substance of AIM (fluorine-water-soluble form, gross content of zinc, lead, nickel, copper, mercury, molybdenum, cobalt, cadmium, chromium, selenium, arsenic.) The standards for these indicators are established based on the specifics of the application of AIM for the treatment of road surfaces.

To work under the contracts of the Government of Moscow in the database of the CQM-system created by us, the AIM quality indicators applied on the roads and sidewalks of the city are recorded. Input, editing and analysis of information on quality indicators were carried out in the complex PDM STEP Suite Enterprise Edition (PSS-EE), for which we had taken up a license (APL-3451631-01). One of the most important aspects of the analysis is the evaluation of each of the AIMs under the "cost-effectiveness" criteria. It allows us to make a choice of a more affordable assortment for the city of Moscow.

The results of this work are considered as new components for the further development of the theory and practice of computer quality management of effective road chemistry materials. The theoretical generalizations proposed in the work will allow developing and applying advanced anti-icing materials more quickly and qualitatively.

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