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IMPROVEMENT OF THE TRANSPORTATION TECHNOLOGY OF REFRIGERATED CONTAINERS THROUGH RISK ASSESSMENT

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In the current conditions of transport logistics development, there is a growing volume of temperature-sensitive cargo transportation, which leads to increased requirements for ensuring its integrity within cold chain supply systems. Maintaining a stable temperature regime is a key factor in the efficiency of such transportation, as even short-term deviations may result in loss of quality or complete spoilage of products.

Refrigerated containers enable the transportation of such cargo within intermodal, multimodal, and combined transport systems due to their standardization and ability to maintain specified microclimate parameters. A distinctive feature of their operation is the combination of stationary and autonomous power supply, as well as the use of modern digital technologies for monitoring transportation parameters.

The transportation process of refrigerated containers is multi-stage and includes pre-trip preparation, pre-cooling, loading, transportation, transshipment between modes of transport, temporary storage, and unloading. Each of these stages is associated with the influence of factors that may lead to the occurrence of hazardous situations.

Considering the nature of the origin of risk factors, it is advisable to distinguish three main groups: human-related, technical and technological, and natural and climatic. This approach makes it possible to systematize the main sources of risks and identify typical hazardous situations characteristic of road transportation of temperature-sensitive cargo.

The most critical hazardous situations include failures of refrigeration equipment or power supply systems, violations of temperature conditions during idle periods, as well as personnel errors in setting operating parameters. Significant impacts are also caused by mechanical damage to containers, violations of loading technology, unauthorized access during parking, and adverse weather conditions. The assessment of the criticality of hazardous situations is advisable to carry out using FMEA/FMECA methods, which allow taking into account the severity of consequences, the probability of occurrence, and the possibility of timely detection of deviations. The use of an expert approach ensures the validity of determining risk priorities and makes it possible to rank hazardous situations according to their level of criticality.

The obtained results make it possible to identify the most critical hazardous situations associated with the transportation of temperature-sensitive cargo in refrigerated containers and to form a basis for further improvement of transportation technology within cold chain supply systems.