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Item 5 (b) of the provisional agenda

Proposed amendments to ATP:**New proposals**

Changes in the models of reports on the measurement of the K coefficient in connection with the need to take account of the power of the fans used in thermal tests to provide for the circulation of air that turns into heat inside the body of special transport equipment

Transmitted by the Russian Federation

*Summary***Executive summary:**

Models Nos. 2 A and 2 B contain a paragraph stating that, in the reports on the thermal tests of the measurement of the heat transfer coefficient (the K coefficient), there is a need to indicate the power (W₂, in Watts) used by fans used during the tests to provide for the circulation of air inside the bodies of special transport equipment.

Bearing in mind that, for this purpose, fans in various locations in the cargo space of the special equipment may be used, including the conventional air-circulating fans with which the majority of special equipment with thermal appliances are fitted, the question arises as to whether all or part of the power used by the fans from the mains that turns into heat inside the body of the special equipment should be taken into account.

Action to be taken:

Introduce the following amendments to ATP models No. 2 A and 2 B.

Related documents:

None.



Introduction

1. ATP contains rather high accuracy requirements for measuring the K coefficient of special equipment bodies. The accuracy of the measurement of the K coefficient depends on the accuracy of the physical quantity used to calculate the value of the K coefficient, including the heat flow inside the body of the special equipment.
2. Sources of thermal energy during thermal tests of special equipment to measure the K coefficient are the heat exchangers and the fans. Fans are used to provide for the circulation of air to control the temperature inside the body of the special equipment and keep within the temperatures required by ATP during testing.
3. Model test reports Nos. 2 A and 2 B contained in ATP refer to “power absorbed by fans”. Such wording does not provide an understanding of just what power used by the fans should be considered in every specific case. At the same time, not in all cases is the record of the full power used by the fans from the main reliable.
4. In this formal document, specialists of the Russian Federation propose to clarify the requirements of ATP concerning the record of the power used by fans during thermal tests of the measurement of the K coefficient.
5. The Russian text of ATP, as amended, valid from 19 December 2016, was used for the proposed amendments.

I. Proposal

6. Change in model test reports Nos. 2 A and 2 B the wording of the specification “Power absorbed by fans” to “Power heat equivalent produced by parts of the fan found within the body of the special transport equipment”.

II. Justification

7. All energy within a closed system ultimately becomes heat. Thus, if all parts used by fans (engine, blades, converters etc.) are within the closed body of the special equipment, the heat power given off by all parts of the fans will be the same in quantity as the electric power used by the fans from the main.
8. However, when carrying out thermal tests to measure the K coefficient of the special equipment with thermal appliances in the form of fans, conventional air-circulating fans with which special equipment is usually fitted may be used. Separate parts of such circulating fans (such as the motor) may be located outside the body of the special equipment.
9. Where separate parts of fans are located outside the body of the special equipment, in specification W2, there is a need to take into account only the power that is produced inside the body of the special equipment in one form or another (indirect heat, mechanical work relating to the transfer of air masses etc.).
10. Let us consider an example where the motor of a conventional fan for special equipment is outside the body of the equipment and the fan blades are inside the body. We have found that the heat given off by the fan motor does not end up inside the body during test procedures. The blades cause the air masses to move, which increases their kinetic energy. The energy used to create friction between the blades and the air masses and the kinetic energy of the movement of air masses turn into heat at some point (kinetic energy does so as the air masses are dragged, including against the inside surface of the body of the special equipment). The heat equivalent of the power consumed by those parts of the fan units that are located inside the body of special equipment may be calculated as the product of the total electrical power that the fans draw from the electrical supply by the efficiency of the air-circulating fan as specified by the manufacturer.

III. Costs

11. There are no additional costs.

IV. Feasibility

12. We consider that the additional heat flow produced by fans during the test process to measure the K coefficient is a typical engineering problem that can be resolved with the known operating conditions of fans and their various locations in bodies of special equipment.

V. Enforceability

13. No problems are foreseen in introducing amendments to report models Nos. 2 A and 2 B contained in ATP.
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