Leaktightness Definitions for and Leakage Tests on Packages for the Transport of Radioactive Materials

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INTRODUCTION

In 1986, the International Organization for Standardization asked a group of experts representing some fifteen countries to draft a standard for the leaktightness of packagings used for the transport of radioactive materials.

Sub-Committee 5 (Nuclear Fuel Technology) was put in charge of coordinating this action within the wider context of TC 85 (Nuclear Energy).

This request met a widely felt need as, although many countries are directly concerned by this subject, very few of them have explicit regulations relating to it.

It was in the USA that the first structured approach to the problem was made: this resulted in the ANSI N 14.5 standard which was first published in 1977 then again, in a revised version, in 1987. Since then, many countries, or at least a large number of operating organizations from many different countries, have adopted this standard which, although it has not received general approval for the entirety of the specifications laid down and solutions proposed, at least has the advantage of proposing a coherent approach to the problem.

PROGRESS OF WORK

In September 1987, the group of experts, which represented Belgium, Canada, the USA, France, Italy, Japan, West Germany, Sweden and the UK, met for the first time in Paris. Their brief was to draft a standard, of which all parts would be approved by the international community and at the same time comply with the recommendations of the International Atomic Energy Agency.

The work started with the analysis of the principal documents then available. The most important of these were the ANSI N 14.5 standard, and the AECP code of practice, published in the UK, as well as documents published in different countries, including France.

By June 1989, four plenary meetings of the group had been held. These made it possible to accurately identify the regulatory points on which there was general agreement. Points on which there are very marked differences between certain countries, concerning the requirements of the competent authorities and the practices of the operating organizations, have also been identified.

The work carried out has consisted both in consulting experts and in carrying out studies to check or establish the validity and applicability of the mathematical expressions used in certain specifications.

Now it appears clear to the working group that the American standard ANSI N 14.5 can be used as a general basis for drafting the ISO standard provided a certain number of changes are made concerning specific requirements of individual competent authorities and to make allowance for certain procedures rightfully applied in certain countries.

Layout of the standard, in view of its highly specific applicability, should, in the opinion of all the members of the working group, resemble as closely as possible that normally adopted in IAEA documents. This will provide the users with a convenient tool due to the use of terminology and a technical approach to the problem which, insofar as possible, complies with the national and international regulations, themselves aligned with the IAEA recommendations.

The work has now reached the stage of preparation of the draft of the standard. Its layout will correspond to that used at the IAEA, who accompanies its recommendations contained in Safety Series SS6 with explanations and suggestions in Safety Series 7 and 37. The result of this will be, at least this is the intention of the group, that the standard published will be as useful as possible for both the competent authorities and the operating organizations. It would also be desirable for it to have an "educative" role in a field in which many questions are raised, both as concerns understanding of the physical phenomena involved and their mathematical interpretation as well as the validity of the experimental work required to ensure proof of compliance with the regulatory requirements.

It is already clear that the views of the members of the group converge concerning the problem it is required to solve. There is broad agreement concerning virtually the entire content proposed for the standard as well as the manner in which it is to be presented. Nevertheless, there is one notable exception (which confirms the rule) concerning the positions currently adopted in the different countries. This relates to the criteria to be apposed during leak tests carried out before shipping of packages.

TEST BEFORE SHIPPING OF PACKAGES

The rules vary between countries, which can be divided into three groups:

- the countries which impose leak tests before shipping based on direct verification of the nominal leakage criterion, ie that calculated when the package was designed ensuring compliance with released activity limits;
- those which accept leak tests using a relaxed criterion before shipping, providing closure of the packages is carried out in accordance with a previously qualified procedure carried out with adequate quality assurance;
- those which use one or other of the above criteria depending on the nature of the packages.

In the interests of unilateral agreement, it might be desirable for single common position to be adopted concerning a specific subject which concerns observance of activity release criteria.

Therefore, consultation with the competent authorities of the different countries represented in the working group is in progress. This is intended to determine whether it would be possible to attain:

- either agreement on a single method,
- or a choice between:
  - direct verification of the nominal leakage criterion,

  or

- indirect verification of the nominal leakage criterion using a relaxed test, subject to prior qualification of the closure procedures and the checking and periodic maintenance operations of the closure system.

In the case where the possibility of using either of the methods is available, their equivalence in terms of the value of the check of compliance with the nominal criterion will naturally have been previously established.

CONCLUSION

Work is currently in full progress, and should be completed within the next few years. It is obvious that any external assistance, whether in the form of comments, on legislation or new theoretical and experimental results, will be welcome as it can only improve the quality and effectiveness of what we hope is high performance and widely used tool.

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