

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Nuclear powers plants – Instrumentation and control important to safety –  
Management of ageing of sensors and transmitters –  
Part 2: Temperature sensors**

**Centrales nucléaires de puissance – Instrumentation et contrôle-commande  
importants pour la sûreté – Gestion du vieillissement des capteurs et des  
transmetteurs –  
Partie 2: Capteurs de température**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**NUCLEAR POWERS PLANTS –  
INSTRUMENTATION AND CONTROL IMPORTANT TO SAFETY –  
MANAGEMENT OF AGEING OF SENSORS AND TRANSMITTERS –**

**Part 2: Temperature sensors**

**FOREWORD**

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International Standard IEC 62765-2 has been prepared by subcommittee 45A: Instrumentation, control and electrical power systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
45A/1218/FDIS	45A/1227/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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- amended.

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## INTRODUCTION

### **a) Technical background, main issues, and organisation of the standard**

With the majority of NPPs over 30 years old, the management of ageing of temperature sensors is currently a relevant topic, especially for those plants that have extended their operating licenses or are considering this option. This standard is intended to be used by operators of NPPs (utilities), systems evaluators, vendors, and by licensors. In the international temperature measurement, the scale of temperature has been updated with ITS-90 since it was published in 1990, so it is necessary that ITS-90 should be addressed in the standard to cover the calibration of measuring and test equipment for temperature sensors.

### **b) Situation of the current standard in the structure of the IEC SC 45A standard series**

IEC 62765 is the third level IEC SC 45A document comprised of several parts to tackle the specific issue of management of ageing of sensors and transmitters in nuclear power plants (NPPs) for I&C systems important to safety. Part 2 of IEC 62765 is dedicated to temperature sensors.

IEC 62342 is the second level standard of SC 45A covering the domain of the management of ageing of nuclear instrumentation systems used in NPPs to perform functions important to safety. IEC 62342 is the introduction to a series of standards to be developed by IEC SC 45A covering the management of the ageing of specific I&C systems or components such as electrical cabling systems (IEC 62465), and sensors and transmitters (IEC 62765).

IEC 62765-2 is to be read in association with IEC 62342 and IEC TR 62096, which is the appropriate IEC SC 45A Technical Report that provides guidance on the decision for modernisation when the management of ageing techniques is no longer successful. For more details on the structure of the IEC SC 45A standard series, see item d) of this introduction.

### **c) Recommendations and limitations regarding the application of this standard**

It is important to note that this standard establishes no additional functional requirements for safety systems. Ageing mechanisms have to be prevented and thus identified by performance measurements in order to minimize their impact on sensor reliability. Aspects for which special recommendations and limitations have been provided in this standard are:

- criteria for the evaluation of ageing of temperature sensors in NPPs;
- steps to be followed to establish the temperature sensor testing requirements for an ageing management program for NPP instrumentation systems; and
- relationships between on-going qualification analysis and ageing management program with regard to temperature sensors.

It is recognised that testing and monitoring techniques used to evaluate the ageing condition of NPPs' sensors and transmitters are continuing to develop at a rapid pace and that it is not possible for a standard such as this to include references to all modern technologies and techniques.

This standard identifies minimum requirements aimed at ensuring that any potential impacts on NPP safety due to the ageing of temperature sensors of NPPs can be identified and that suitable actions are undertaken to demonstrate that the safety of the plant will not be impaired. To ensure that this standard will continue to be relevant in future years, the emphasis has been placed on issues of principle, rather than specific technologies.

### **d) Description of the structure of the IEC SC 45A standard series and relationships with other IEC documents and other bodies documents (IAEA, ISO)**

The top-level documents of the IEC SC 45A standard series are IEC 61513 and IEC 63046. IEC 61513 provides general requirements for I&C systems and equipment that are used to perform functions important to safety in NPPs. IEC 63046 provides general requirements for electrical power systems of NPPs; it covers power supply systems including the supply