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Nuclear powers plants - Instrumentation and control important to safety - Management of ageing of sensors and transmitters - Part 1: Pressure transmitters

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/18

Obsahuje: EN 62765-1:2017, IEC 62765-1:2015

EUROPEAN STANDARD

EN 62765-1

NORME EUROPÉENNE

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October 2017

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English Version

**Nuclear powers plants - Instrumentation and control important
to safety - Management of ageing of sensors and transmitters -
Part 1: Pressure transmitters
(IEC 62765-1:2015)**

Centrales nucléaires de puissance - Instrumentation et
contrôle-commande importants pour la sûreté - Gestion du
vieillessement des capteurs et des transmetteurs - Partie 1:
Transmetteurs de pression
(IEC 62765-1:2015)

Kernkraftwerke - Leittechnik mit sicherheitstechnischer
Bedeutung - Alterungsmanagement von Sensoren und
Transmittern - Teil 1: Drucktransmitter
(IEC 62765-1:2015)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

EN 62765-1:2017**European foreword**

This document (EN 62765-1:2017) consists of the text of IEC 62765-1:2015 prepared by SC 45A "Instrumentation, control and electrical systems of nuclear facilities" of IEC/TC 45 "Nuclear instrumentation".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-09-11
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-09-11

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Endorsement notice

The text of the International Standard IEC 62765-1:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61508-1	NOTE	Harmonized as EN 61508-1.
IEC 61508-2	NOTE	Harmonized as EN 61508-2.
IEC 61508-3	NOTE	Harmonized as EN 61508-3.
IEC 61508-4	NOTE	Harmonized as EN 61508-4.
IEC 61513	NOTE	Harmonized as EN 61513.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60671	-	Nuclear power plants - Instrumentation and control systems important to safety - Surveillance testing	EN 60671	-
IEC 60780	-	Nuclear power plants - Electrical equipment of the safety system - Qualification	-	-
IEC 61226	-	Nuclear power plants - Instrumentation and control important to safety - Classification of instrumentation and control functions	EN 61226	-
IEC 62138	-	Nuclear power plants - Instrumentation and control important for safety - Software aspects for computer-based systems performing category B or C functions	EN 62138	-
IEC 62342	-	Nuclear power plants - Instrumentation and control systems important to safety - Management of ageing	-	-
IEC 62385	2007	Nuclear power plants - Instrumentation and control important to safety - Methods for assessing the performance of safety system instrument channels		-
IEC 62465	2010	Nuclear power plants - Instrumentation and control important to safety - Management of ageing of electrical cabling systems		-



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Nuclear powers plants – Instrumentation and control important to safety –
Management of ageing of sensors and transmitters –
Part 1: Pressure transmitters**

**Centrales nucléaires de puissance – Instrumentation et contrôle-commande
importants pour la sûreté – Gestion du vieillissement des capteurs et des
transmetteurs –
Partie 1: Transmetteurs de pression**

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Edition 1.0 2015-04

INTERNATIONAL STANDARD

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**NUCLEAR POWERS PLANTS –
INSTRUMENTATION AND CONTROL
IMPORTANT TO SAFETY – MANAGEMENT
OF AGEING OF SENSORS AND TRANSMITTERS –****Part 1: Pressure transmitters****FOREWORD**

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International Standard IEC 62765-1 has been prepared by subcommittee 45A: Instrumentation, control and electrical systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

The text of this standard is based on the following documents:

FDIS	Report on voting
45A/1001/FDIS	45A/1015/RVD

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

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

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INTRODUCTION

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

With the majority of NPPs over 20 years old, the management of ageing of transmitters (pressure, level, flow) 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, and by licensors.

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 comprising 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 1 of IEC 62765 is dedicated to pressure transmitters.

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 ageing of specific I&C systems or components such as electrical cabling systems (IEC 62465), and sensors and transmitters (IEC 62765).

IEC 62765 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 management of ageing techniques are 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 detected by performance measurements. Aspects for which special recommendations and limitations are provided in this standard are:

- criteria for evaluation of ageing of pressure transmitters in NPPs;
- steps to be followed to establish pressure transmitter testing requirements for an ageing management program for NPP instrumentation systems; and
- relationship between on-going qualification analysis and ageing management program with regards to pressure transmitters.

It is recognised that testing and monitoring techniques used to evaluate the ageing condition of NPPs 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 ageing of pressure transmitters of NPP 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 document of the IEC SC 45A standard series is IEC 61513. It provides general requirements for I&C systems and equipment that are used to perform functions important to safety in NPPs. IEC 61513 structures the IEC SC 45A standard series.

IEC 61513 refers directly to other IEC SC 45A standards for general topics related to categorization of functions and classification of systems, qualification, separation of systems, defence against common cause failure, software aspects of computer-based systems, hardware aspects of computer-based systems, and control room design. The standards referenced directly at this second level should be considered together with IEC 61513 as a consistent document set.

At a third level, IEC SC 45A standards not directly referenced by IEC 61513 are standards related to specific equipment, technical methods, or specific activities. Usually these documents, which make reference to second-level documents for general topics, can be used on their own.

A fourth level extending the IEC SC 45A standard series, corresponds to the Technical Reports which are not normative.

IEC 61513 has adopted a presentation format similar to the basic safety publication IEC 61508 with an overall safety life-cycle framework and a system life-cycle framework. Regarding nuclear safety, it provides the interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. In this framework IEC 60880 and IEC 62138 correspond to IEC 61508-3 for the nuclear application sector. IEC 61513 refers to ISO as well as to IAEA GS-R-3 and IAEA GS-G-3.1 and IAEA GS-G-3.5 for topics related to quality assurance (QA).

The IEC SC 45A standards series consistently implements and details the principles and basic safety aspects provided in the IAEA code on the safety of NPPs and in the IAEA safety series, in particular the Requirements SSR-2/1, establishing safety requirements related to the design of Nuclear Power Plants, and the Safety Guide NS-G-1.3 dealing with instrumentation and control systems important to safety in Nuclear Power Plants. The terminology and definitions used by IEC SC 45A standards are consistent with those used by the IAEA.

NOTE It is assumed that for the design of I&C systems in NPPs that implement conventional safety functions (e.g. to address worker safety, asset protection, chemical hazards, process energy hazards) international or national standards would be applied, that are based on the requirements of a standard such as IEC 61508.

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

Part 1: Pressure transmitters

1 Scope

This part of IEC 62765 provides strategies, technical requirements, and recommended practices for the management of ageing to ensure that ageing of pressure transmitters important to safety in nuclear power plants (NPPs) can be identified and that suitable remedial actions are undertaken as necessary to demonstrate that the safety of the plant will not be impaired. This standard is aligned with the IEC 62342 standards, which provides guidance on ageing management for I&C systems important to safety in NPPs. This standard, IEC 62765-1, is the first part for pressure transmitters in the IEC 62765 sensor and transmitter series for pressure, temperature, neutron and other sensors.

This standard deals with analogue electronic pressure transmitters, which have an electrical signal output that is a function of pressure applied on the sensing part, and which are included in I&C systems important to safety in accordance with IAEA terminology.

Any software used for data acquisition, data qualification, or data analysis for transmitter testing or condition monitoring system for pressure transmitter is classified according to IEC 62138 depending on its functionality as specified in IEC 61226. The qualification of the software for the digital data processing is beyond the scope of this standard.

Additional condition monitoring system for ageing management of the pressure transmitters is classified according to IEC 61226 with respect to its functionality. If classified, the software installed in the monitoring system complies with IEC 62138 for its B or C categorised function.

Regarding environmental qualification, the requirements of IEC 60780 apply. For assessing the performance of transmitters in the safety system instrument channel, the IEC 62385 methods, IEC 61888 requirements and IEC 60671 surveillance testing requirements apply.

Pressure measurements may be used for the measurement of other parameters that can be related to pressure, e.g., level or flow. Interfaces which include sensing lines, condensing pots, and primary (e.g., flow) elements between process and transmitters are within the scope of this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60671, *Nuclear power plants – Instrumentation and control systems important to safety – Surveillance testing*

IEC 60780, *Nuclear power plants – Electrical equipment of the safety system – Qualification*

IEC 61226, *Nuclear power plants – Instrumentation and control important to safety – Classification of instrumentation and control functions*

IEC 62138, *Nuclear power plants – Instrumentation and control important for safety – Software aspects for computer-based systems performing category B or C functions*

IEC 62342, *Nuclear power plants – Instrumentation and control systems important to safety – Management of ageing*

IEC 62385:2007, *Nuclear power plants – Instrumentation and control important to safety – Methods for assessing the performance of safety system instrument channels*

IEC 62465:2010, *Nuclear power plants – Instrumentation and control important to safety – Management of ageing of electrical cabling systems*

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