SVENSK STANDARD SS-EN 61500

Fastställd	Utgåva	Sida	Ansvarig kommitté
2012-06-13	1	1 (1+15)	SEK TK 45

Kärnkraftanläggningar – Instrumentering och styrsystem av betydelse för säkerheten – Datakommunikation i system för realisering av funktioner i kategori A

Nuclear power plants –
Instrumentation and control important to safety –
Data communication in systems performing A functions

Som svensk standard gäller europastandarden EN 61500:2011. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61500:2011.

Nationellt förord

Europastandarden EN 61500:2011

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61500, Second edition, 2009 - Nuclear power plants - Instrumentation and control important to safety - Data communication in systems performing A functions**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-IEC 1500, utgåva 1, 1997, gäller ej fr o m 2014-08-08.

ICS 27.120.20

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

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Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

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Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61500

August 2011

ICS 27.120.20

English version

Nuclear power plants - Instrumentation and control important to safety - Data communication in systems performing category A functions

(IEC 61500:2009)

Centrales nucléaires de puissance - Instrumentation et contrôle-commande importants pour la sûreté - Communication de données dans les systèmes réalisant des fonctions de catégorie A
(CEI 61500:2009)

Kernkraftwerke - Leittechnik mit sicherheitstechnischer Bedeutung - Datenkommunikation in Systemen, die Kategorie-A-Funktionen ausführen
(IEC 61500:2009)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61500:2011 E

SEK Svensk Elstandard

Foreword

The text of the International Standard IEC 61500:2009, prepared by SC 45A, Instrumentation and control of nuclear facilities, of IEC TC 45, Nuclear instrumentation, was submitted to the formal vote and was approved by CENELEC as EN 61500 on 2011-08-08 without any modification.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-08-08
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-08-08

As stated in the nuclear safety directive 2009/71/EURATOM, Chapter 1, Article 2, item 2, Member States are not prevented from taking more stringent safety measures in the subject-matter covered by the Directive, in compliance with Community law.

In a similar manner, this European standard does not prevent Member States from taking more stringent nuclear safety measures in the subject-matter covered by this standard.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61500:2009 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 60068 series	NOTE	Harmonized in EN 60068 series (not modified).
IEC 60721 series	NOTE	Harmonized in EN 60721 series (not modified).
IEC 60964	NOTE	Harmonized as EN 60964.
IEC 60965	NOTE	Harmonized as EN 60965.
IEC 61158-3-19	NOTE	Harmonized as EN 61158-3-19.
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 61784-3	NOTE	Harmonized as EN 61784-3.
IEC 62138	NOTE	Harmonized as EN 62138.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60709	-	Nuclear power plants - Instrumentation and control systems important to safety - Separation	EN 60709	-
IEC 60780	1998	Nuclear power plants - Electrical equipment of the safety system - Qualification	-	-
IEC 60880	2006	Nuclear power plants - Instrumentation and control systems important to safety - Software aspects for computer-based systems performing category A functions	EN 60880	2009
IEC 60980	-	Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations	-	-
IEC 60987 (mod)	2007	Nuclear power plants - Instrumentation and control important to safety - Hardware design requirements for computer-based systems	EN 60987	2009
IEC 61000	Series	Electromagnetic compatibility (EMC)	EN 61000	Series
IEC 61226	-	Nuclear power plants - Instrumentation and control important to safety - Classification of instrumentation and control functions	EN 61226	-
IEC 61513	-	Nuclear power plants - Instrumentation and control for systems important to safety - General requirements for systems	-	-
IEC 62340	2007	Nuclear power plants - Instrumentation and control systems important to safety - Requirements for coping with common cause failure (CCF)	EN 62340	2010
IAEA Safety guide NS-G-1.3	2002	Instrumentation and control systems important to safety in nuclear power plants	-	-

CONTENTS

INTRODUCTION

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

The equipment for data communication of on-line plant data can simplify the hardwired cables connecting distributed systems for instrumentation, control, protection and monitoring needed for safe Nuclear Power Plants operation. Such communication systems can have advantages over direct cables, for electrical isolation, for reduction of cable fire loads or other reasons. In a distributed computer based system, communication equipment is an essential part of the system. Data communication is usually essential for implementing I&C systems important to safety in nuclear power plants.

It is intended that the standard be used by operators of NPPs (utilities), manufacturers of data communication equipment, systems evaluators and by licensors.

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

IEC 61500 is the third level IEC SC 45A document tackling the generic issue of data communication for equipment performing category A functions.

IEC 61500 is to be read in association with IEC 61513, which is the appropriate IEC SC 45A document providing guidance on general requirements for instrumentation and control systems important to safety, IEC 60880, which is the appropriate IEC SC 45A document providing guidance on software aspects for computer based systems performing category A functions, and IEC 60987 which is the appropriate IEC SC 45A document providing guidance on hardware aspects for computer based systems .

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 the standard

It is important to note that this standard establishes no additional functional requirements for safety systems.

Aspects for which special recommendations have been provided in this standard are:

- Requirements for data communication within systems performing category A functions.
- Requirements for data communication between divisions of a system performing category A functions.
- Requirements for data communication of systems performing category A functions with systems of lower safety importance.
- Reliability requirements for data communication.

To ensure that the standard will continue to be relevant in future years, emphasis is placed on principles, rather than on 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,

defense 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 and provides an interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. Compliance with IEC 61513 will facilitate consistency with the requirements of IEC 61508 as they have been interpreted for the nuclear industry. 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 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 NS-R-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 SC 45A standards are consistent with those used by the IAEA.

NUCLEAR POWER PLANTS – INSTRUMENTATION AND CONTROL IMPORTANT TO SAFETY – DATA COMMUNICATION IN SYSTEMS PERFORMING CATEGORY A FUNCTIONS

1 Scope

This International Standard establishes requirements for data communication which is used in systems performing category A functions in nuclear power plants.

It covers also interface requirements for data communication of equipment performing category A functions with other systems including those performing category B and C functions and functions not important to safety.

The scope of this standard is restricted to the consideration of data communication within the plant I&C systems. It does not cover communication by telephone, radio, voice, fax, email, public address etc.

The internal operation and the detailed technical specification of data communication equipment are not in the scope of this standard. This standard is not applicable to the internal connections and data communication of a processor unit, its memory and control logic. It does not concern the internal processing of instrumentation and control computer systems.

This standard gives requirements for functions and properties of on-line plant data communications by reference to IEC 60880 and IEC 60987, produced within the framework of IEC 61513. It requires classification of the communication functions in accordance with IEC 61226, which in turn requires environmental and seismic qualification (i.e., the environment where the safety function is required to operate) according to IEC 60780 and IEC 60980.

2 Normative references

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

IEC 60709, *Nuclear power plants – Instrumentation and control systems important to safety – Separation*

IEC 60780:1998, *Nuclear power plants – Electrical equipment of the safety system – Qualification*

IEC 60880:2006, *Nuclear power plants – Instrumentation and control systems important to safety – Software aspects for computer-based systems performing category A functions*

IEC 60980, *Recommended practices for seismic qualification of electrical equipment of the safety system for nuclear generating stations*

IEC 60987:2007, *Nuclear power plants – Instrumentation and control important to safety – Hardware design requirements for computer-based systems*

IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*

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

IEC 61513, *Nuclear power plants – Instrumentation and control for systems important to safety – General requirements for systems*

IEC 62340:2007, *Nuclear power plants – Instrumentation and control systems important to safety – Requirements for coping with common cause failure (CCF)*

IAEA safety guide No. NS-G-1.3:2002, *Instrumentation and Control Systems Important to Safety in Nuclear Power Plants*