

© Copyright SEK. Reproduction in any form without permission is prohibited.

## Tillförlitlighetsverksamhet – Del 3-14: Riktlinjer – Underhåll och underhållsstöd

*Dependability management –  
Part 3-14: Application guide –  
Maintenance and maintenance support*

Som svensk standard gäller europastandarden EN 60300-3-14:2004. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60300-3-14:2004.

### Nationellt förord

Europastandarden EN 60300-3-14:2004

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60300-3-14, First edition, 2004 - Dependability management - Part 3-14: Application guide - Maintenance and maintenance support**

utarbetad inom International Electrotechnical Commission, IEC.

---

ICS 03.100.40; 03.120.01

## *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.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

## *SEK är Sveriges röst i standardiseringssarbetet inom elområdet*

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

## *Stora delar av arbetet sker internationellt*

Utdriften 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).

Standardiseringssarbetet 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 standardiseringssverksamhet och medlemsavgift till IEC och CENELEC.

## *Var med och påverka!*

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtidens 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.

### **SEK Svensk Elstandard**

Box 1284  
164 29 Kista  
Tel 08-444 14 00  
[www.elstandard.se](http://www.elstandard.se)

English version

**Dependability management  
Part 3-14: Application guide -  
Maintenance and maintenance support  
(IEC 60300-3-14:2004)**

Gestion de la sûreté de fonctionnement  
Partie 3-14: Guide d'application -  
Maintenance et support de maintenance  
(CEI 60300-3-14:2004)

Zuverlässigkeitmanagement  
Teil 3-14: Anwendungsleitfaden -  
Instandhaltung und  
Instandhaltungsbereitschaft  
(IEC 60300-3-14:2004)

This European Standard was approved by CENELEC on 2004-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

**Foreword**

The text of document 56/929/FDIS, future edition 1 of IEC 60300-3-14, prepared by IEC TC 56, Dependability, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60300-3-14 on 2004-05-01.

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) 2005-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-05-01

Annex ZA has been added by CENELEC.

---

**Endorsement notice**

The text of the International Standard IEC 60300-3-14:2004 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 9000            NOTE            Harmonized as EN ISO 9000:2000 (not modified).

---

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

| <u>Publication</u> | <u>Year</u>     | <u>Title</u>   | <u>EN/HD</u>  | <u>Year</u>        |
|--------------------|-----------------|--|---------------|--------------------|
| IEC 60300-1        | 2003            | Dependability management<br>Part 1: Dependability management systems   | EN 60300-1    | 2003               |
| IEC 60300-2        | 2004            | Part 2: Guidelines for dependability management  | EN 60300-2    | 2004               |
| IEC 60300-3-2      | - <sup>1)</sup> | Part 3: Application guide<br>Section 2: Collection of dependability data from the field  | -             | -                  |
| IEC 60300-3-3      | - <sup>1)</sup> | Part 3-3: Application guide - Life cycle costing   | -             | -                  |
| IEC 60300-3-10     | - <sup>1)</sup> | Part 3-10: Application guide - Maintainability   | -             | -                  |
| IEC 60300-3-11     | - <sup>1)</sup> | Part 3-11: Application guide - reliability centered maintenance  | -             | -                  |
| IEC 60300-3-12     | - <sup>1)</sup> | Part 3-12: Application guide - Integrated logistic support   | EN 60300-3-12 | 2004 <sup>2)</sup> |
| IEC 60706-3        | - <sup>1)</sup> | Guide on maintainability of equipment<br>Part 3: Sections Six and Seven - Verification and collection, analysis and presentation of data | -             | -                  |
| IEC 60706-5        | - <sup>1)</sup> | Part 5 - Section 4: Diagnostic testing   | -             | -                  |
| IEC 60812          | - <sup>1)</sup> | Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)                                      | HD 485 S1     | 1987 <sup>2)</sup> |
| IEC 61025          | - <sup>1)</sup> | Fault tree analysis (FTA)  | HD 617 S1     | 1992 <sup>2)</sup> |
| IEC 61649          | - <sup>1)</sup> | Goodness-of-fit tests, confidence intervals and lower confidence limits for Weibull distributed data                                     | -             | -                  |

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.



## CONTENTS

|       |   |    |
|-------|---|----|
| 1     | Scope .....   | 7  |
| 2     | Normative references .....                              | 7  |
| 3     | Terms, definitions and acronyms .....                   | 8  |
| 3.1   | Terms and definitions .....                             | 8  |
| 3.2   | Acronyms .....  | 11 |
| 4     | Maintenance and maintenance support overview .....      | 11 |
| 4.1   | Life cycle aspects .....                                | 11 |
| 4.1.1 | General .....   | 11 |
| 4.1.2 | Scenarios for maintenance and maintenance support ..... | 12 |
| 4.1.3 | Concept and definition phase .....                      | 13 |
| 4.1.4 | Design and development phase .....                      | 13 |
| 4.1.5 | Manufacturing phase .....                               | 14 |
| 4.1.6 | Installation phase .....                                | 14 |
| 4.1.7 | Operation and maintenance phase .....                   | 14 |
| 4.1.8 | Disposal phase .....                                    | 15 |
| 4.2   | Description of maintenance .....                        | 15 |
| 4.2.1 | General .....   | 15 |
| 4.2.2 | Maintenance policy and concept .....                    | 15 |
| 4.2.3 | Indenture levels .....                                  | 16 |
| 4.2.4 | Maintenance echelons .....                              | 16 |
| 4.2.5 | Preventive and corrective maintenance .....             | 16 |
| 4.3   | Description of maintenance support .....                | 17 |
| 5     | Management responsibility .....                         | 17 |
| 5.1   | Management commitment .....                             | 17 |
| 5.2   | Customers .....   | 18 |
| 5.3   | Maintenance policy .....                                | 18 |
| 5.4   | Planning of maintenance and maintenance support .....   | 18 |
| 5.5   | Responsibility, authority and communication .....       | 18 |
| 6     | Maintenance process implementation .....                | 19 |
| 6.1   | General .....   | 19 |
| 6.2   | Maintenance management .....                            | 19 |
| 6.3   | Maintenance and maintenance support planning .....      | 20 |
| 6.3.1 | General .....   | 20 |
| 6.3.2 | Determination of maintenance support .....              | 21 |
| 6.3.3 | Maintenance task identification .....                   | 22 |
| 6.3.4 | Maintenance task analysis .....                         | 23 |
| 6.3.5 | Identification of maintenance support resources .....   | 23 |
| 6.4   | Maintenance preparation .....                           | 24 |
| 6.5   | Maintenance execution .....                             | 24 |

|       |   |    |
|-------|---|----|
| 7     | Resource management.....  | 25 |
| 7.1   | Provision of resources.....   | 25 |
| 7.2   | Human resources .....   | 26 |
| 7.2.1 | General .....   | 26 |
| 7.2.2 | Training .....  | 26 |
| 7.3   | Infrastructure.....   | 27 |
| 7.3.1 | General .....   | 27 |
| 7.3.2 | Support equipment .....   | 27 |
| 7.3.3 | Built-in test equipment (BITE).....   | 29 |
| 7.3.4 | Maintenance facilities .....  | 29 |
| 7.3.5 | Administration and technical facilities .....                                     | 29 |
| 7.3.6 | Computerized maintenance information systems .....                                | 30 |
| 7.4   | Information resources.....  | 30 |
| 7.4.1 | General .....   | 30 |
| 7.4.2 | Documentation .....   | 30 |
| 7.4.3 | Maintenance information .....   | 33 |
| 7.5   | Materials and spare parts .....   | 34 |
| 7.5.1 | General .....   | 34 |
| 7.5.2 | Spare parts quantification .....  | 34 |
| 7.5.3 | Spare parts identification .....  | 36 |
| 8     | Measurement, analysis and improvement.....  | 37 |
| 8.1   | General .....   | 37 |
| 8.2   | Monitoring and measurement .....  | 37 |
| 8.2.1 | General .....   | 37 |
| 8.2.2 | Customer-related measurement.....   | 37 |
| 8.2.3 | Maintenance-related measurement.....  | 38 |
| 8.3   | Maintenance assessment .....  | 38 |
| 8.4   | Maintenance improvement.....  | 39 |
| 8.5   | Modifications .....   | 39 |
|       | Annex A (informative) Factors affecting maintenance and maintenance support ..... | 40 |
| A.1   | General .....   | 40 |
| A.2   | Application to complex systems .....  | 40 |
| A.3   | Factors during the design phase .....   | 40 |
| A.4   | Factors during the operation and maintenance phase .....                          | 41 |
|       | Bibliography.....   | 43 |
|       | Figure 1 – Maintenance and maintenance support during the life cycle .....        | 12 |
|       | Figure 2 – Interrelationship of maintenance terms.....                            | 15 |
|       | Figure 3 – Types of maintenance tasks .....                                       | 17 |
|       | Figure 4 – Maintenance processes.....   | 19 |
|       | Figure 5 – Maintenance and maintenance support planning process .....             | 21 |
|       | Figure 6 – Spare parts provisioning process .....                                 | 36 |

**DEPENDABILITY MANAGEMENT –****Part 3-14: Application guide –  
Maintenance and maintenance support****1 Scope**

This part of IEC 60300 describes a framework for maintenance and maintenance support and the various minimal common practices that should be undertaken. The purpose of this standard is to outline, in a generic manner, management, processes and techniques related to maintenance and maintenance support that are necessary to achieve adequate dependability to meet the operational needs of the customer.

NOTE 1 Maintenance and maintenance support are a major element of dependability as described in IEC 60300-1 and IEC 60300-2.

In some cases, regulatory and other mandatory requirements need to be considered. Maintenance and maintenance support requirements and obligations may therefore need to be specified in a contract, which cites this standard.

This standard is intended for use by a wide range of suppliers, maintenance support organizations and users and can be applied to all items.

This standard is applicable to items, which include all types of products, equipment and systems (hardware and associated software). Most of these require a certain level of maintenance to ensure that their required functionality, dependability, capability, economic, safety and regulatory requirements are achieved.

NOTE 2 For consistency, this standard will use the term “item” as defined in 3.1.5, except where the context requires otherwise.

**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 60300-1:2003, *Dependability management – Part 1: Dependability management systems*

IEC 60300-2:2004, *Dependability management – Part 2: Guidelines for dependability management*

IEC 60300-3-2, *Dependability management – Part 3: Application guide – Section 2: Collection of dependability data from the field*

IEC 60300-3-3, *Dependability management – Part 3: Application guide – Section 3: Life cycle costing*

IEC 60300-3-10, *Dependability management – Part 3-10: Application guide – Maintainability*